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EXCLUSIVE FIRST LOOK

DELUXEPAINT

for the Amiga

Guide to AmigaDOS
Commands

C-128 BASIC Tokens
Revealed

Software Reviews:

The Halley Project

Ultima IV: Quest of the Avatar

Little Computer People Project

Swiftsheet

Steinman Spreadsheet

Proteus

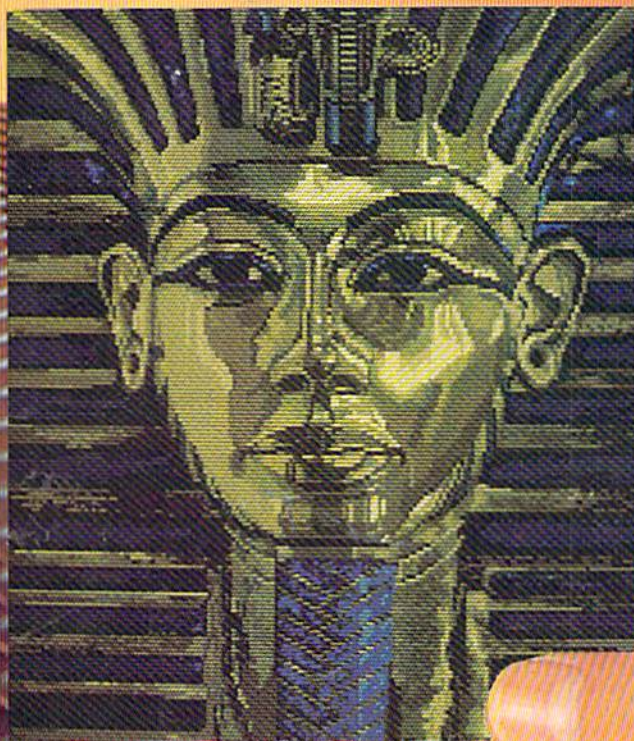
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Free C-64 programs:

Personal Library Manager

Directory Alphabetizer

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for the Amiga



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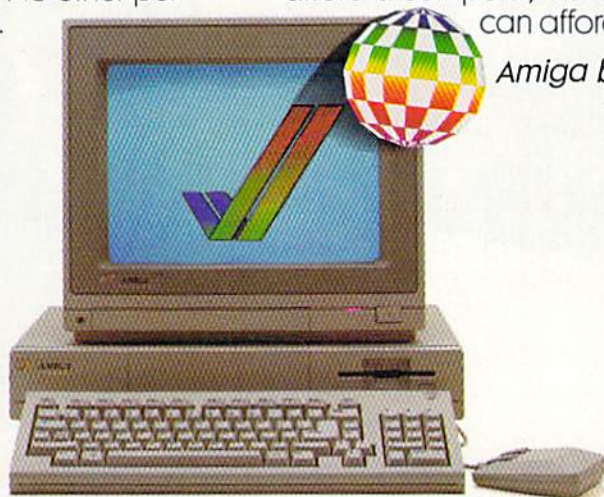
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by Jim Gracely, Technical Editor

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LETTERS

Electronic Cottage Controversy

Reading your article, "The Electronic Cottage Controversy," in the September/October 1985 *Commodore Microcomputers* sparked quite a bit of anger. I myself operate a home-based mail-order business—licensed and registered—which was my *only* reason for purchasing a home computer. Most people buy computers with business in mind, not video games, and for the AFL-CIO to say they are *protecting* us [by seeking a ban on computer work at home] is an absolute joke!

Here on Long Island, there are many minimum-wage companies who practice incredible methods of bureaucracy, abuse and non-benefits against their employees. Most of these companies fire you if you attempt to bring in a union. What is the AFL-CIO doing to protect *these* people?

If you read between the "Syntax Errors," you will see that the AFL-CIO obviously has something to hide, and this ban is being imposed to prevent us programmers from digging into their computers to find out!

Michael Ceden
Brentwood, New York

1541 Electrical Interference

My son's *Winnie the Pooh in the Hundred Acre Woods* program was having difficulty loading some of the screen files and would sometimes provide an error message indicating a problem with the 1541 disk drive. This led me to believe that the drive might be out of alignment.

So I checked with the "Check/Adjust Alignment" function of the *1541 Disk Drive Alignment Program* from CSM Software. This function determines the time to access every seventh section of every fourth track of a Calibration Disk supplied with the program. Proper alignment is indicated if the program reports a "timing number" of about 100. The program was indicating timing numbers of 110 to 113, and the blinking red light on the drive indicated that there was difficulty in accessing sector eight of tracks five and one.

The disk drive and TV normally sit on the top shelf of a cart which I roll up to a side arm on the desk where

my Commodore 64 is set for use. Because there is not enough room on the cart to disassemble and adjust the drive, I moved it to my desk top. I then rechecked my timing number and found that it was 101 to 102—well within the acceptable range—and there was practically no trouble accessing the disk. However, upon returning the drive to the cart, the timing number returned to 110 or greater.

A little investigation showed that if the disk drive was to the left of my TV (or my Commodore 1701 monitor), there was trouble accessing the drive. When the drive was to the right, there was little or no trouble.

In conclusion, setting the disk drive to the left of a TV or monitor can produce symptoms which mimic alignment problems. Readers might want to check for this type of interference before going to the trouble of having a drive realigned.

Jack Ryan
El Dorado, Arkansas

As a general rule, disk drives and disks should never be stored anywhere near sources of electromagnetic fields—one of which is the transformer in your TV or monitor—to the right, left, or otherwise. In this case, however, placing the drive a little farther away from the 1701's transformer made a big difference. Nevertheless the left-right "rule" is not necessarily applicable to all TV's and monitors, whose transformers may be located in a different place.

Work Station Improvements

In the September/October 1985 *Commodore Microcomputers*, there was an article by Tom Benford called "Build This Economical Ergonomic Work Station." The work station can be improved with a few minor changes.

I plan to cut a hole in the desk where the back portion of the disk drive is to be placed. This will improve cooling ventilation. I also plan to put the printer on a lower level so it will not be necessary to stand up to see what is being printed. And lastly, I plan to add a small cantilevered shelf below the desktop to hold the power supply. This will keep it off the floor (where it can be kicked) and off the main desktop to reduce clutter and heat.

Incidentally, it is a no-no around

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"The File Manager allows individualized file formats...A wide variety ranges from the ability to create printed lists...to a selective report feature that lets you access a certain group of records." RUN, April 1985.

"Worth the money, if only for the spreadsheet." InfoWorld, Dec. 17, 1984.

"As a marriage of convenience and value, the program succeeds handsomely...Tri Micro's spreadsheet possesses impressive features." Commodore Microcomputer, May-June 1985.

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"Rug Rider is definitely a challenge. It gives the hard core game player as much action and thrills as he or she could possibly want." POWER PLAY, April 1985.

Rug Rider, Entertainer 1, Corom Snowdrifts & Sunny Skies, Ghost Town

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TRIOMICRO



LETTERS

here to have food or drink anywhere near our Commodore, unlike the author's coffee mug "input device!"

W. W. Varnedoe, Jr.
Huntsville, Alabama

Many readers have commented on the coffee mug sitting on top of the disk drive in the photo on page 85 of that issue. Author Tom Benford swears the mug is there to hold pencils and such—not coffee.

One Plus One Equals One

In your Editor's Notes of the November/December 1985 issue of *Commodore Microcomputers*, you suggested that we keep in touch. Well, here is my response. I hope it will be helpful.

The dividing line between the *Commodore Microcomputers* and *PowerPlay* is becoming less clear, as you point out. I add that this is much to my satisfaction. I am especially pleased with the increased emphasis on programs other than games! The File Handler program in the June/July issue of *PowerPlay* has proven especially useful. I have used it not only as a mailing list but have compiled a directory of Commodore 64 programs. The sorting by fields (subjects) has proven to be an outstanding feature, and my formerly haphazard search for articles has given way to a pointed search. I did convert the program to upper/lower case, as it looks better that way, especially on mailing lists.

The programs Multi-Screen and Com 64 Grapher in the November/December issue have found application in several places for me. The Multi-Screen has found its way into two of my own modest efforts at programming.

Keep it up, please! May I suggest that a spreadsheet program would be very much appreciated. On this one, I assure you that I am not alone.

Again, thank you for the quality of the programs in your two magazines.

Fred W. Fischer
Fort Wayne, Indiana

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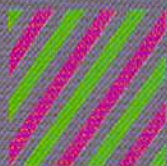
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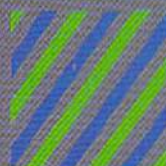
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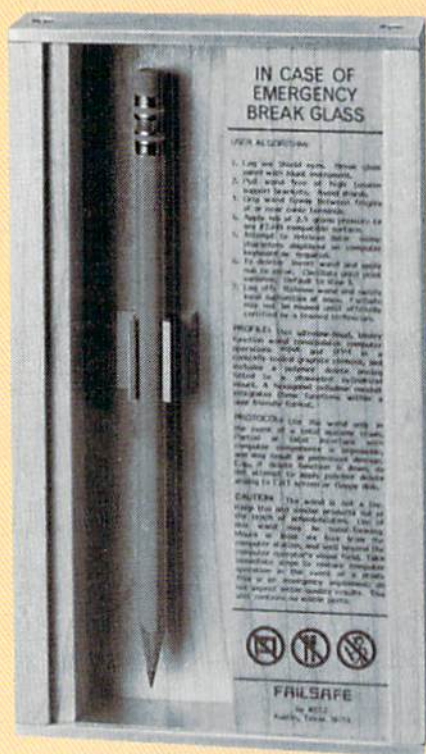
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To operate Failsafe, follow the User Algorithm: To log on, shield eyes and break glass panel with blunt instrument. Pull wand free of high tension support brackets and grip wand firmly at or near center. Apply 2.5 grams of pressure on any compatible surface. To retrieve data, mimic characters displayed on computer keyboard, or to delete, invert wand and apply nub to error until print vanishes. To log off, release wand and notify local authorities at once. Failsafe may not be reused until officially certified by a trained technician.

Though such detailed instructions for the simple motor skills are hardly required, and though the dangerous wand need not be kept from impressionable schoolchildren, the Witz Company hopes that a Failsafe on the wall will ward off high-tech myopia, gratify the innocent, and inspire many chuckles. Failsafe is available for \$20 at department and book stores, or directly from the Witz Company at P.O. Box 49023, Austin, TX 78765.

Hockey Brawls for All

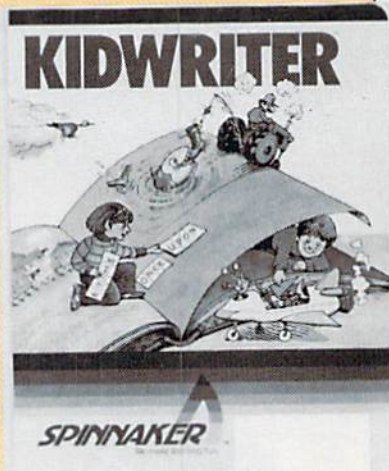
Computer hockey fans will be happy to know that Artworx has released **International Hockey**, a sequel to its **Slap Shot Hockey**. The new game lets you play directly against the computer using the one-player mode, which offers three levels of proficiency. However, overly aggressive play provokes a bench-clearing, glove-throwing fight scene. Penalty shots can be awarded to either team.

International Hockey retails for \$24.95. (Artworx, 150 North Main Street, Fairport, New York 14450.)

Develop Foreign Language Skills

Kidwriter, available in French, Spanish or German for the Commodore 64, makes it possible for children to create a colorful storybook in any of those languages. Based on the original English program by Spinnaker Software, **Kidwriter** helps children develop foreign language vocabulary skills. A child selects from 100 characters and objects to form scenes and develop, in the foreign language, a story line to go with it. Picture-story pages may be linked together and saved to create the student's storybook. **Kidwriter** also introduces children to the fundamentals of word processing.

Each version of **Kidwriter** retails for \$37.95. (Gessler Educational Software, 900 Broadway, New York, NY 10003.)



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64 Gold is making this software available for \$5.00 per disk. Programs include communications with up/downline loading capabilities, word processing, educational software, utilities, games, and graphics. A catalog of the 64 Gold library is available free from 64 Gold, 3219 Folsom Street, San Francisco, CA 94110.

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A demonstration disk costs \$10, and can be returned for \$10 credit toward **Videofile**'s retail price of \$49.95. (Videofile, Box 480210, Los Angeles, California 90048.)



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Public Domain Software
for the
COMMODORE 64



64 GOLD

Bookkeeping

Smada Enterprises has released **The Tallybook**, an integrated double-entry bookkeeping system for small businesses. Available for the Commodore 64/128 and Plus 4, its features include password protection; chart of accounts development and modification; general ledger with simultaneous monthly, quarterly, and yearly totals; payroll with social security, federal and state income tax deductions; report generator for monthly, quarterly, and yearly financial reports; and budget analysis.

The program and detailed instruction manual are available for \$24.95 plus \$3.00 shipping and handling from Smada Enterprises, P.O. Box 1382, Bellevue, NE 68005. **The Tallybook** has an unconditional 15-day money-back guarantee and lifetime performance guarantee.

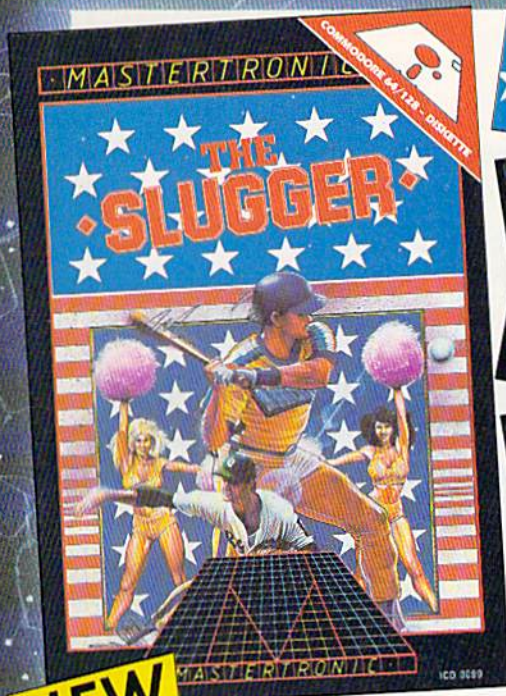


Educational Software

Learning Technologies offers 20 educational software titles for the Commodore 64 that include a Learning Kit with each program. The Kit consists of five coordinated learning aids: a 17 x 22 color poster of the software package, a lesson plan, activity work sheet, student management chart, and award certificate. For more information, contact Learning Technologies at 4255 LBJ Freeway #131, Dallas, TX 75244. The toll free number is 800-328-4277 (in Texas, 214-991-4958).

THERE'S NO BEATING

MASTERTRONIC



NEW

A superb sports simulation program with stunning 3-D graphics. A one or two player game that enables you to either compete head to head or against the computer.

Features include a self demo mode for instructions, a giant video screen for close-ups of the action in detail. Exciting to play with real baseball features, yet a detailed knowledge of the game is not essential: Steal Options, Curved balls, Pitchers Cheers leaders are all part of the incredible features that make this game an essential part of every collection.

C64/128
DISC



NEW

Join in the fastest moving game in the world, when you play 5-a-side soccer, an action packed sports simulation from Mastertronic.

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3D animated graphics one or two player game.
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C64/128
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Comet Watch

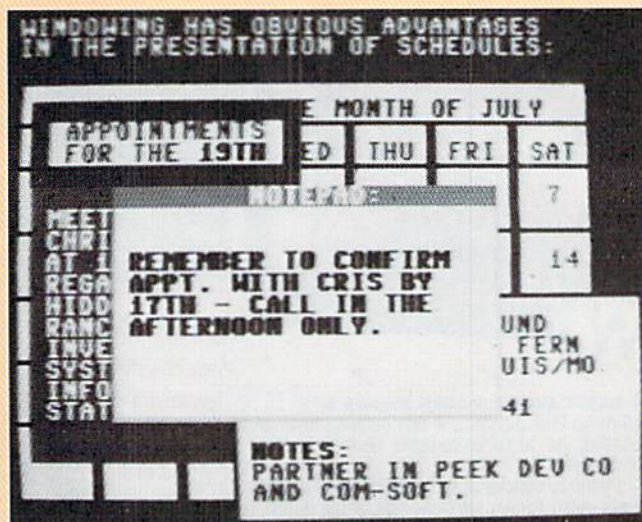
Zephyr Services has released **CometWatch**, a program for the Commodore 64 that calculates comet data and provides background on the physics of comets and how to observe them. Detailed information on Halley's Comet and its return to the sun in 1985/86 is included.

CometWatch lets you calculate and plot any comet orbit in relation to the sun and orbits of Mars, Jupiter, Saturn, and Uranus, using either the table of comet data provided or your own data. You can also calculate Halley's position in the sky for any date, time, latitude and longitude, and plot its encounters with the earth and sun, past and present.

CometWatch is available from Zephyr Services for \$19.95.
(Zephyr Services, 306 S. Homewood Avenue, Dept. A, Pittsburgh, PA 15208)

Geography Games

Radarsoft's **Maps USA**, **Maps World**, and **Maps Europe** are designed to help children learn geography. They feature helicopter races in search of states, cities and waterways, and are intended for ages nine and up. The games also familiarize children with the directions north, south, east and west. Distributor is Adam, Cobb & King, 665 John Muir Drive E411, San Francisco, California 94132.



Windowing for the Commodore 64

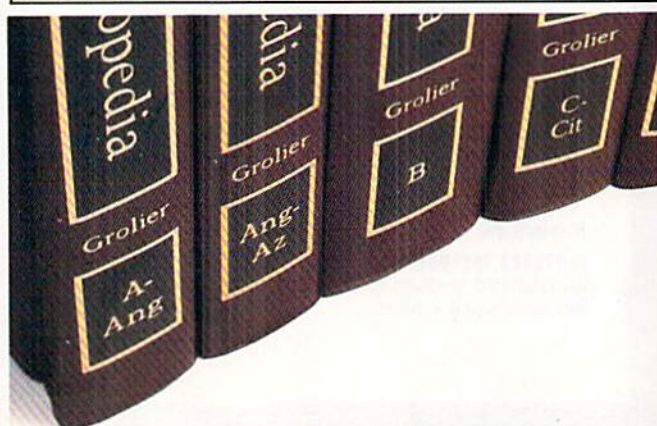
St. Mars Systems has released **Windows**, a screen processor utility that gives the Commodore 64 windowing capabilities in BASIC or assembly language programs. **Windows** features individual window color controls, window move commands, independent window scrolling, and cursor positioning routines.

Windows is available for \$24.95 and includes a 12-page programming guide from St. Mars Systems, 1400 Clay Street, Winter Park, FL 32789.

Mental Work-Out

Able Software has released **Idle Time II**, a collection of eight thought-provoking games for the Commodore 64 to be played against the computer or another player. Test your knowledge of the United States and its cities, try to come up with the correct mathematical equation to avoid a lunar crash, rearrange gibberish into English, play numerical reverse, or manipulate colored squares to solve a cube puzzle.

The program retails for \$19.95 plus \$2.00 shipping and handling from Able Software, P.O. Box 422, Kulpville, PA 19443.



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A-riding on a pony,

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- My Old Kentucky Home • Turkey in the Straw
- My Bonnie Lies Over the Ocean • Goober Peas
- Red River Valley • Oh! Susanna • Dixie
- The Yellow Rose of Texas • Yankee Doodle
- Who Threw the Overalls in
Mistress Murphy's Chowder?

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Spy vs. Spy Sequel

First Star Software has released the sequel to **Spy vs. Spy**, a spy game based on the MAD Magazine cartoon. **Spy vs. Spy II: The Island Gaper** features the cloaked spies in search of buried missile parts on an exotic tropical island. The game uses First Star's proprietary Simulvision/Simulplay techniques, which allow two players to play and watch each other's actions at the same time. In the one-player version, the computer controls the opposing spy. Both spies dodge sharks, snares, coconuts and bombs, while trying to avoid quicksand, cliffs, and deadly lagoons.

The game for the Commodore 64 retails for \$29.95. (First Star Software, 18 E. 41st Street, New York, NY 10017)

State-of-the-Art Computer

Intec has introduced a computer easy enough for everyone to understand, operate, and afford. It is the Generic computer, a joke gift that features a pencil as the printer, a small pun-filled dictionary as the word processor, and color crayons for graphics. They are contained in a black-and-white box that resembles a computer keyboard. The "computers" may be ordered directly from Intec for \$5.95 plus 50 cents for shipping. (Intec, 676 Polk Street, Eugene, Oregon 97402.)

Software Source

Detailed information on over 3,000 programs that run on Commodore machines is now available from .MENU. Managed by the International Software Database Corporation, .MENU will help locate, evaluate, and order software. Virtually every package listed on the data base can be purchased through the .MENU/STX Software Transfer Service. To order Commodore software or obtain a listing of currently available inventory, write .MENU Customer Service at 1520 South College Avenue, Fort Collins, Colorado 80524, or call (800)-THE-MENU.

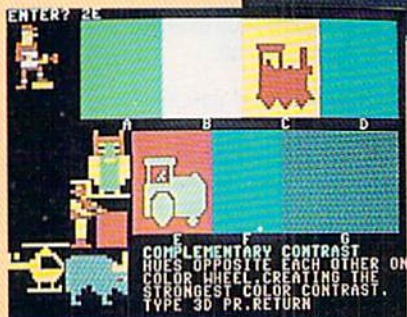
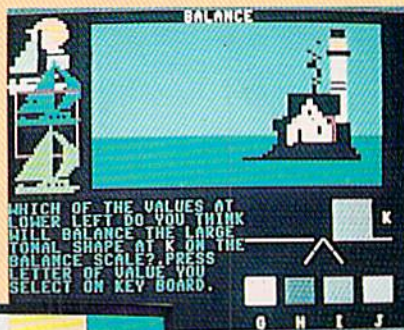
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Art Instruction

Principles of Composition teaches you about color, texture, composition, design, shapes, and pattern as they apply to creating art. It includes a design test and immediate criticism to illustrate what comprises good design. Written in BASIC for the Commodore 64, the program comes on two disks, and is intended for ages 12 and up. It retails for \$149. (Art Instruction Software, P.O. Box 1352, Patchogue, NY 11772)



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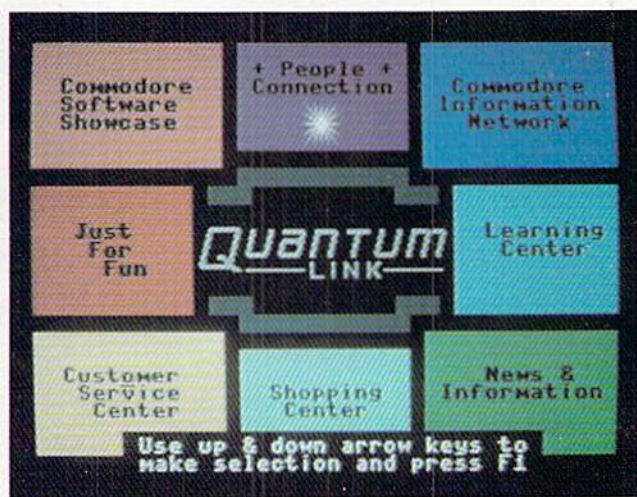
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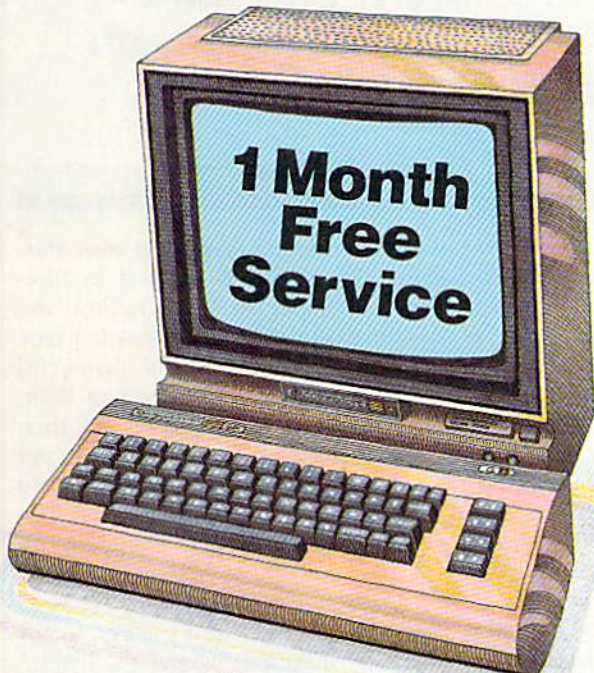
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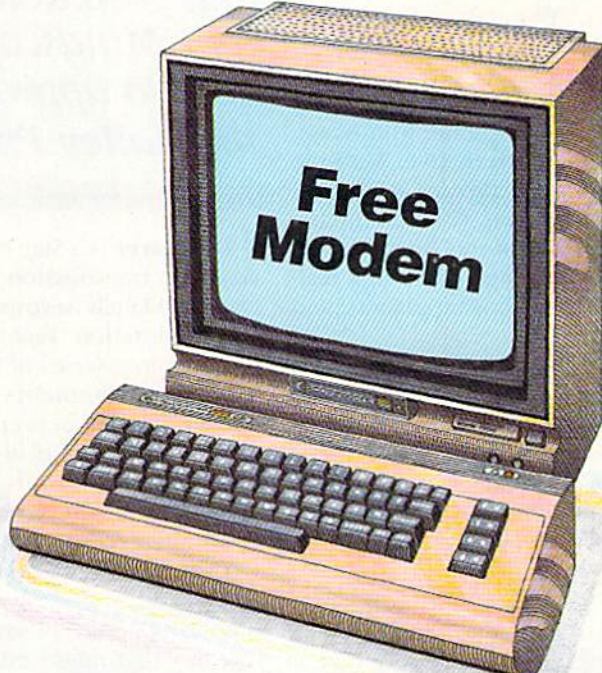
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Mail card or this coupon to Quantum Computer Services, Inc., 8620 Westwood Center Drive, Vienna, Virginia 22180.

*If you use more than the included 1 hour of Plus services each month, you will be billed for the extra time. Offer valid in Continental U.S. for new subscribers only. Expires 6/30/86.

The Halley Project: A Mission in Our Solar System

Computer: Commodore 64

Publisher: Mindscape

3444 Dundee Road
Northbrook, IL 60062

Medium: Disk

Price: \$39.95

For those not content with merely watching Halley's Comet, Mindscape offers a stunning alternative. With the help of *The Halley Project: A Mission in Our Solar System*, you can hitch a ride on the back of this cosmic wanderer, slicing through space in a realistic tour of neighboring planets, and moons.

Checking the designer credits on this package uncovers the familiar name of Tom Snyder Productions, an educational software team. But in *The Halley Project*, lessons are now moved to outer space, providing a galactic classroom packed with excitement and adventure.

Halley Hints Clues to Calm Hyper-Spacepeople

An audio cassette welcomes the pilot with an introductory briefing (a transcript is also provided). A complete technical reference guide helps familiarize you with the ship's operations, a bibliography is provided to aid your research team, and a "Simple Star Map" gives a visual representation of each constellation of the zodiac. Take time to absorb all of this pre-flight material, so you'll be ready for anything.

But preparation and execution are two different things. This is a clocked contest, and when all is said and done, merely completing a mission will not stand up in the realm of competitive flying. The ultimate goal is to carry out a successful flight in as short a



Only when you complete all ten missions and gain access to the secret code number will Mindscape send you instructions on how to approach the final mission—the Halley Project itself.

The player is a Star Pilot, contacted via audio transmission from the Planetary and Lunar Aerospace Navigation and Exploration Team (P.L.A.N.E.T.) to undergo a series of ten interstellar training assignments. These challenges are for screening purposes only, to test prospective candidates for courage, tenacity and detailed knowledge of the solar system needed for the eventual Halley Project.

Your base is the comet itself, from

which you launch and land your starship. The action is viewed in first-person perspective from behind the dashboard of the space vessel, a true scientific marvel that's powerful enough to travel the speed of light, jump through hyperspace, and then instantaneously screech to a halt, yet simplistic enough to be flown and mastered by any pre-teen pilot. The control panel is orderly, capped by an

Continued on pg. 20

time as possible. Below, I've listed a few tips that might help shave some minutes off the star search.

- First and foremost, remember: When your ship stops, so does the clock. If you become confused or lost, or if you are scanning back and forth to locate a planet, it is always best to bring your craft to a complete halt. Low-level drifting is more often than not the pilot's biggest waste of time.

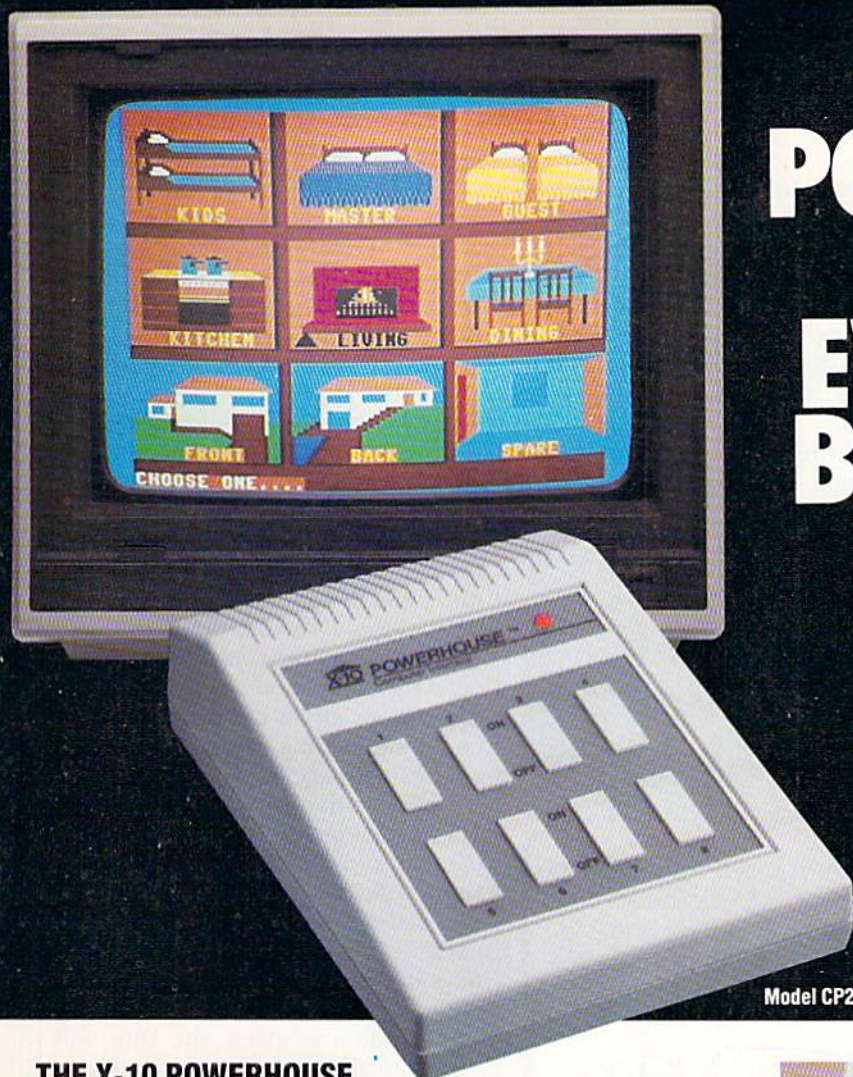
- It's also worth noting that the clock is always put on hold whenever hyperspace is engaged. So, even though its use is usually determined by the situation and not strategy, this mode should also be entered whenever possible.

- When approaching a destination, there are times when you can let the planet's motion work for you. If you are in the path of a body whose orbital movement will guide it in your direction, shut down your ship's engines and wait for it to come to you.

Not only will this stop the clock, but there are instances where it will actually allow for a more gradual, smoother approach. Just be ready to turn and run in case you are not granted landing clearance.

- One of the hardest exercises in Star Pilot training is the orbiting that is required while awaiting landing authorization. Undoubtedly, every flyer will, at one time or another, lose large chunks of time with a series of awkward, errant planetary passes. A better approach is to position yourself about 17,000 kilometers from your average-size destination, stop your ship, and then use the scanning motion of your idle vessel to comb the surface. If you don't get any reaction from the ground crew, move directly to the other side of the planet and try again. Note that you don't necessarily have to fly over your allied base to be allowed to land; you just have to spot it in your viewing screen.

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and then plug the Module into an outlet. The Interface can control up to 256 Modules throughout your home and won't interfere with normal use of lights and appliances.

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SOFTWARE REVIEWS

oversized viewing screen. At the beginning of each mission, a message outlines the destination. Early on, these dispatches will be relatively specific, clearly designating an exact planetary port. But as a player progresses, the object of his travels may not be so clear, with goals presented only as clues. And unless you have massive amounts of astronomical knowledge, a bit of research may be in order to avoid being forever lost in

space.

After the designation is ratified, it's time to get where you're going, a three-stage process involving launching, navigating, and landing. The first step is easy enough: a simple tap on the keyboard sends you on your way. Halley's white spherical body with its twinkling tail slowly disappears behind you.

Navigating, on the other hand, might seem onerous at first, since the

familiar readings of your trusty pocket compass will be of little use in these precincts. Courses must be plotted by star gazing. Using a rounded radar screen encircled with the names of all 12 zodiacal constellations, pilots must first locate their target planet, then check the title of the constellation behind it. After that, it's just a matter of pointing the craft in the right direction, gauging the distance, and speeding off to your destination.

This is an unfamiliar but precise navigational exercise, one that epitomizes the design of this package. The positioning, distance, orbit, size, and speed of every heavenly body included in this simulation are very realistic. The moons circle the planets, which circle the sun in a spectacularly choreographed space dance.

Once your ship comes within 100,000 kilometers of its destination, you must orbit while you wait for landing clearance from a ground base. This low-speed circling process is an exercise of steady flying and patient tenacity, perhaps the hardest of all piloting skills to master. Once landing authorization is given, the ship will automatically be pulled in for touchdown. Here you can take a short break, peek at the planetary surface, and call up instructions on the next step of your mission, which will ultimately take you back to Halley's Comet.

There are ten test challenges which must be sequentially completed before access is granted to the program's secret code number. When the Registration for Certification card is returned to P.L.A.N.E.T. Headquarters at Mindscape with the correct secret code number, only then will the Star Pilot be mailed special instructions on how to approach the final mission: The Halley Project itself. Exactly what that encompasses, I couldn't say. I'm only half way there, currently blasting off on my "Darter" assignment in search of a planet without an atmosphere.

But one day soon I'll earn my wings, as will anyone else who is willing to invest some time to learn a little about our solar system. One can only hope that this program will provide an engaging spectacle which not only interests its viewer, but is a stimulant for further involvement and understanding.

TEAM-MATE: THE SINGLE SOLUTION TO THE CLUTTER THAT CAN TIE UP YOUR DESK

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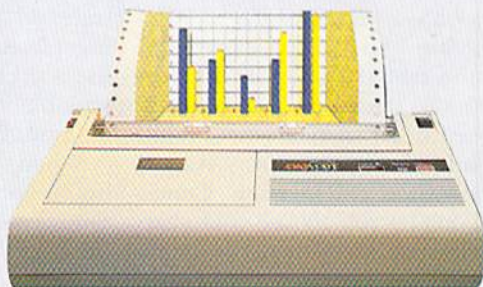
Waterfall by Deluxe Paint™, Electronic Arts.

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Ultima IV: Quest of the Avatar

Computer: Commodore 64
Publisher: Origin Systems (Design)
 Electronic Arts (Distrib.)
 2755 Campus Drive
 San Mateo, CA 94403

Medium: Disk
Price: \$36.00

Richard Garriott (a.k.a. Lord British) has thrown out the classic formula of "seek and slay the evil wizard"—there's no deadly spawn of Exodus or Minax to track down in the latest installment of the *Ultima* saga. And Garriott didn't stop after he dreamed up a fresh scenario—he went on to boldly expand the concept of character development and introduce an unprecedented degree of character interaction. In doing so, he has reinvented the fantasy role-playing game.

Character development has always meant increasing the points of your party members' attributes: strength, charisma, dexterity, and so on. Here you must also develop eight virtues—humanistic values such as honesty, compassion, honor and valor. Your current ratings for the virtues aren't displayed with the attributes, hit point levels and other data, so you'll have to consult Hawkwind, the royal seer, to learn which virtues need improvement. Eventually, he'll proclaim you fit to visit one of the shrines for "partial elevation" of a virtue. This is an essential element of the quest, for you must become a partial avatar in each virtue before you will be capable of finding the fabled Codex. Hidden in the depth of a maze called the Stygian Abyss, the Codex enables you to fulfill the quest by becoming a true Avatar.

Unlike other role-playing games, *Avatar* won't let you choose your character's class or race—just the name and sex. In a series of full-screen illustrations, a gypsy shows you some fortune-telling cards and asks multiple-choice questions based on the different combinations that may appear. Each card represents one of the eight

In this new role-playing game from Lord British, you must develop eight virtues, including honesty, compassion, honor and valor.



virtues, and your answers determine your character type—Fighter, Paladin, Bard, Druid, Tinker, Ranger, Shepherd or Mage. Each class pursues a particular virtue and hails from a city that is devoted to it. Each virtue has its own

shrine, a rune needed to enter it, and a special mantra, or chant, that you must know in order to meditate there and become a partial avatar.

The game diverges from estab-

Continued on pg. 122

Tips for Aspiring Avatars

After spending the past month in Britannia, I've acquired some general strategy tips and learned a few secrets that can considerably reduce the frustration factor. While developing your character's virtues and attributes in the early stages, you should concentrate on finding mandrake root and nightshade (not sold in stores) and the secret formula for the gate spell, which teleports you to the moon gate of your choice.

When elevated to partial avatarhood, you see a "vision." Copy each one down exactly; otherwise you'll be in serious trouble at the end of the game. Also jot down the names of the people in each town. Sometimes one will tell you another character can answer your question, but won't mention where he or she lives.

Unless you thrive on combat, don't

get more than two or three new characters to join you until you're ready for the dungeons: the larger your party, the more monsters you'll face in combat and the more time you spend fighting. Be sure to make a second scenario disk and always save your game on both so you'll have a back-up.

If you don't like the character the gypsy gives you, just start over. Even better, you can completely circumvent the gypsy's influence on your character by always choosing the honor card when it's one of the pair she offers. That way, you'll begin as a Paladin, the strongest and best equipped of the classes. Another tip not mentioned in the manual: If you say "health" to him, Lord British will heal your wounds and restore hit points. But visit the healers often, or you'll never become an Avatar. **C**

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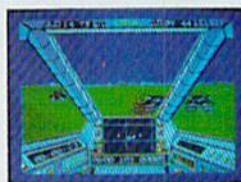
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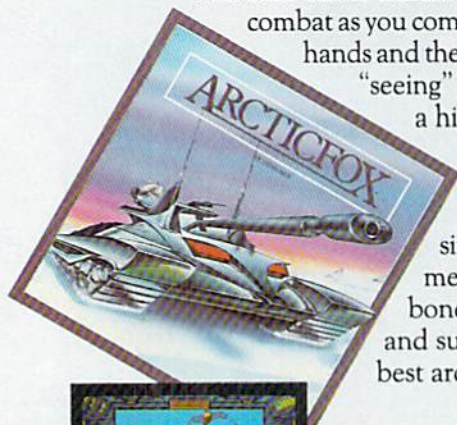
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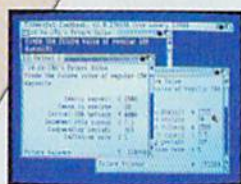
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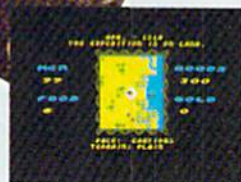


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Little Computer People Project

Computer: Commodore 64

Publisher: Activision
2350 Bayshore Frontage
Rd.
Mountain View, CA
94043

Medium: Disk

Price: \$34.95

Activision's Little Computer People (LCP) Research Group has finally confirmed what many of us have suspected all along. All those little glitches in your software — all those hiccups in your programs — the ones you just haven't been able to explain away? Well, it's time someone broke the news, and it might as well be me. Yes, there really IS someone living in your computer.

According to the Activision publication *Modern Computer People*, the 1½-inch high computer dwellers were lured into the open when the LCP Research Group constructed a house on a disk and loaded it into their computer. After what seemed like an interminable wait, the doorbell rang, and a little person walked in — followed by his dog. Since then, through the use of other houses on disks, says *Modern Computer People*, many Little Computer People (LCP's) have been discovered living in computers all over the world. The LCP Research Group has been asking anyone interested in studying these human-looking little creatures to help them learn about the LCP's habits.

If you want to participate in the LCP Research Project, all you have to do is get Activision's *Little Computer People Project* software, which provides you with your own House-on-a-Disk. Loading the house into your 64 will help you entice your own LCP into view, where you can study him — and his dog.

My 12 year-old daughter, Susanne, and I recently acquired a House-on-a-Disk and began our studies. Much to our astonishment, we discovered that

It's time someone broke the news, and it might as well be me. Yes, there really IS someone living in your computer.



He depends on you to bring him food, keep his water cooler filled, provide him with records and books — and to pet him occasionally.

we really do have an LCP living in our 64. Ours is male, with whitish hair and a little brown dog. (According to Activision, each LCP is different.)

We found out his name is Thomas when he typed us a letter and signed it. And, although he does his typing in English, when he speaks to us — or talks on the phone — he uses some other language whose intonations sound like a circuit with sinus trouble. My daughter's main frustration in studying Thomas, in fact, is this language barrier. "Why don't they have something you can plug in that translates what he's saying?" she fumes.

As we studied Thomas, we discovered we can communicate with him in a limited fashion by typing messages in English. We can ask him to play the piano, for instance — and he has quite a repertoire that ranges from Mozart to boogie-woogie. He also likes to play records from his rather extensive collection of (very) original albums — and will do so either on request or whenever the spir-

it moves him. We found out that we can also ask him to play one of the three games he keeps in his office cabinet: card war, anagrams and poker — although Susanne is convinced that he doesn't really like to play card war very much. And she should know — she's spent hours and hours observing and interacting with him.

The real trick to this project is keeping Thomas in good physical and mental shape. Once we had lured him into the house, you see, we became responsible for his welfare. He depends on us to bring him food, keep his water cooler filled, provide him with records and books — and to pet him occasionally. The manual told us that if we fail to do any of these things, he becomes unhappy — and, finally, sick.

As difficult as it was, in the name of Science, we decided to test Thomas' physical limits — to see just how much neglect he could stand before he became ill. So we let his food and

Continued on pg. 122

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Your Personal Financial Planner

Computer: Commodore 64

Publisher: Timeworks

444 Lake Cook Road
Deerfield, IL 60015

Medium: Disk

Price: \$59.95

Your *Personal Financial Planner* contains four integrated money management programs. Each interacts with the others to organize and control your finances. The programs will not only help you keep track of cash flow, but will advise you on sound career, investment, insurance and retirement moves.

Financial Planner is similar to a human financial advisor. A financial advisor first must know everything about your finances. Likewise, you must first enter all the information *Financial Planner* needs. This includes the status of your checking and saving accounts, retirement plans, stocks and bonds, insurance premiums, and household budget. Finding and inputting all this data takes time. Fortunately, once stored on a transaction data disk, data can automatically be accessed by the four individual sections of *Financial Planner*.

The program comes with two systems disks, but you will also need four data disks to store information: one each for financial transactions, budget, assets and liabilities, and reports.

"Transaction Manager" keeps track of your expenditures (cash, check and credit cards). It keeps current information on the status of up to five bank accounts and up to ten credit cards. The information generated by "Transaction Manager" is automatically used by the other programs included in *Financial Planner*. "Transaction Manager" also lets you print checks and generate financial reports.

The "Budget Manager" program establishes a yearly budget, taking into account the money needed to achieve long-term goals like college for the kids or a new car. The pro-

The "Financial Future" module of Financial Planner lets you establish goals and set priorities.

gram also generates bar charts to illustrate the direction your finances are headed.

Program three, "Asset/Liability Manager," details your true assets/liability status. This one can either make or break you. You may find you have accumulated more wealth than you realized, or discover most of your money has vanished.

The fourth program is "Financial Future." I found this the most valuable section of *Financial Planner*, since it lets you establish goals and set priorities for each. For instance, in the future you may want to build a new house, send two kids to college, and take an extended trip to China. All are important, but chances are the children's education has higher priority than a new house, and the new house might be more important than the extended vacation.

By using "Financial Future," you can assign each a priority number. Then you must decide how much money you will need to accomplish your goal. Next, you tell the program the date you wish to accomplish your goals (the years the children start college, the summer you want to go to China).

The program then tells you how much money you must generate each year to fulfill your dreams. It does this using your financial statement, taking into consideration the effect inflation is expected to have on your dollars. The program can't perform miracles. There is no way to send two children to Yale and retire at age 40 on an income of \$200 a week. But *Financial Planner* helps you get the maximum use from your dollars. It helps you target the goals you can accomplish and perhaps pinpoint expenses you can trim.

If you are serious about planning your financial future, *Financial Plan-*

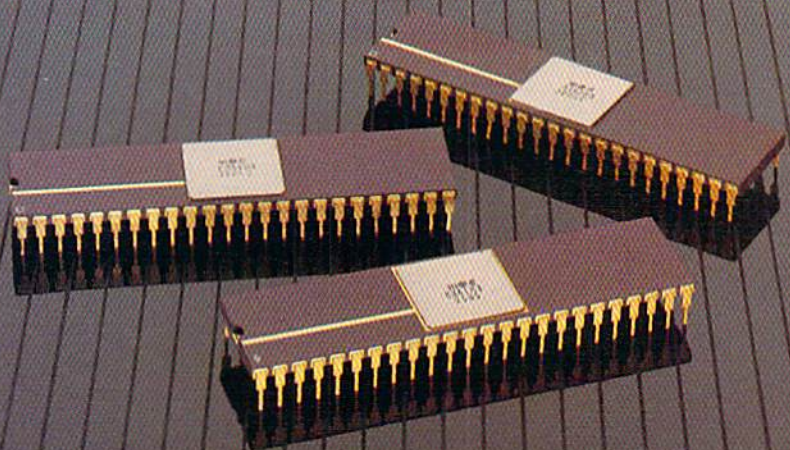
ner can help. But this is not a program for the lazy. Just getting ready to use the program will take hours of reading and typing. However, once the data is entered, using *Financial Planner* is easy. Options are selected from pull-down menus. To activate an option, you simply highlight it and press RETURN. To escape an option, all you need do is press the left-arrow key.

If you want a hard copy of any of the screen displays, just press the F2 key. This dumps the screen display to the printer. If you need the service of a calculator, press F7. A full-featured calculator display appears in the center of the screen. You use it just as you would a hand-held model. The escape key (left arrow) makes the calculator disappear, leaving the screen display unchanged.

To make life a little easier, a "memo pad" is included. The F8 key causes a window to appear where you can leave yourself a note or read a previous note. I found this feature very handy. For instance, if you need to find the phone number of your banker so you can later add it to a transaction file, you can leave yourself a reminder here. Or if you have a money certificate which is near maturity, you can leave yourself a reminder to either reinvest or cash it.

Timeworks has gone to extremes to make *Financial Planner* easy to use. The detailed, 192-page manual is easy to read and is as interesting as a manuscript detailing money matters can be. But if you are unaccustomed to terms like nonmarketable assets, adjusting for new budget indexes, asset/liability records and insurance worksheets, plan on spending more than a few hours becoming comfortable with *Financial Planner*. To assure that you get the full benefits of using the program, Timeworks has established a Customer Support Hotline. The number is toll free.

The combination of cost-free support, thoughtful program design, complete manual (including a quick reference section), helpful on-screen calculator, and screen dump option make this financial advisor an outstanding buy. If you are serious about managing your finances, *Your Personal Financial Planner* is serious about helping you.



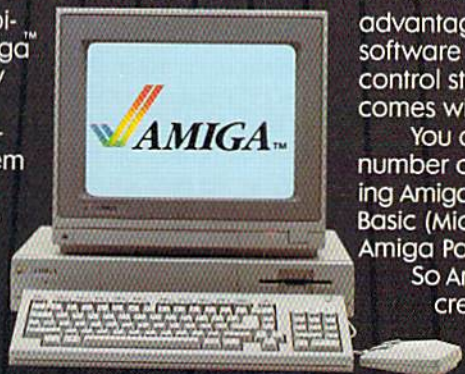
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Swiftsheet

Computer: Commodore 128

Publisher: Cosmi

415 N. Figueroa Street
Wilmington, CA 90744

Medium: Disk

Price: \$29.95

Swiftsheet is a serious spreadsheet for the Commodore 128. It is large enough (64 columns by 254 rows) for very demanding models, yet simple enough for home budgeting.

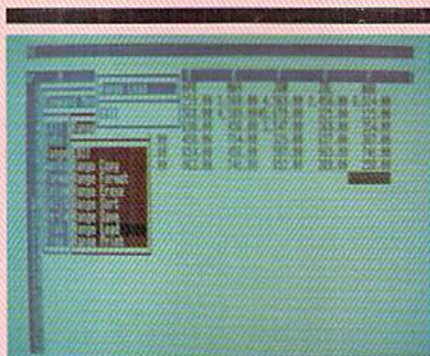
One of its unusual features is its ability to autoboot. The appearance of this feature in commercial software is a rare pleasure. We'll see more of it, of course, but there is always something special about the first time.

Insert the disk in your drive, set your monitor to RGB, your computer to 80-column display, and turn everything on. Booting from the 1541 takes about one minute. Presumably this will be much faster on the 1571 drive. Once it is running, a screen lists all the key commands to enter and manipulate information.

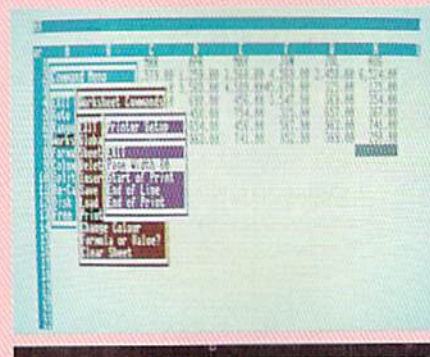
When you do scroll or use your cursor for any reason, *Swiftsheet* allows you to use either set of cursor keys. So if, like me, you're finding it difficult to break the habit of using the Commodore 64 cursor keys, you won't find it frustrating.

Obviously, spreadsheets are made for manipulating numbers. However, this program also lets you use any row or column for text, making it possible to use the spreadsheet format for a chart of text only. In addition, *Swiftsheet* allows you to use the numerical keypad for quick entry. The ENTER key is not supported, though, because in a spreadsheet, your next cell could be across, up, down or back. Using the cursor keys for entry sends your cursor to the next cell in any direction, making this method just a bit quicker than using ENTER and then the cursor.

As with any good spreadsheet, all math functions are supported and many of the more complicated ones are built in, relieving you of the need to remember complex formulas and saving you a few keystrokes. As an example, many spreadsheets find an



Swiftsheet provides 45K of free memory — more memory than in an empty 64. It's the difference between working on a writing board and on an executive-sized desk.



example, many spreadsheets find an average from a formula such as "SUM(A4,L4)/12." In *Swiftsheet*, the formula is "@MEAN(A4,L4)"—a little easier to remember.

You'll also have the ability to use IF and IF GOTO statements, and to create look-up tables. To make these operations less blind, both horizontal and vertical screen splitting is supported, along with independent scrolling of the halves.

It's easy to become accustomed to generosity. Without thinking about it a great deal, I acknowledged the fact that *Swiftsheet* gives me 45K of free memory to use for my data. A day or two later, it occurred to me that that was more memory than in an empty

64! Call it elbow room—it's the difference between working on a writing board and working on an executive-sized desk.

Pop-up menus take you through the working of *Swiftsheet*, making it unnecessary for you to commit every facet of operation to memory. Pressing F5 brings up the first menu. Use the cursor keys to highlight your operation, press F5 again, and a sub-menu pops up, giving you still more options.

I've had as many as four menus on the screen at once, and because they are windows of different colors, there is little to confuse you. The slight overlap reminds you that you may only work with the foreground menu.

Speed is important in a spreadsheet, and all of *Swiftsheet* resides in RAM. There is no need for disk access, thereby making entries and recalculation fast. Though my preliminary instructions made no mention of the fact, I'd wager Cosmi designed this to take advantage of the fast (2MHz) mode inherent in the 128.

To make it easy for you to get started, *Swiftsheet* contains several templates. There is a demo showing how to set up a sheet to show Internal Rate of Return (IRR), as well as working templates for home budgeting, loan analysis, expenses, and car expenses. Each template may be modified.

Speaking of modifications, *Swiftsheet* also allows for custom printer configurations, making it compatible with almost everything. The printer parameters you enter are saved to your disk along with your numbers.

It is rather easy for a company to simply convert a program from the 64 to the 128, modify it to an 80-column display, and redesign the packaging. Thankfully, Cosmi did not choose this course. Though there was an earlier spreadsheet called *Swiftcalc*, Cosmi did not convert it. Instead, they kept the best features and incorporated them into *Swiftsheet*, while taking advantage of all the new and special features of the 128.

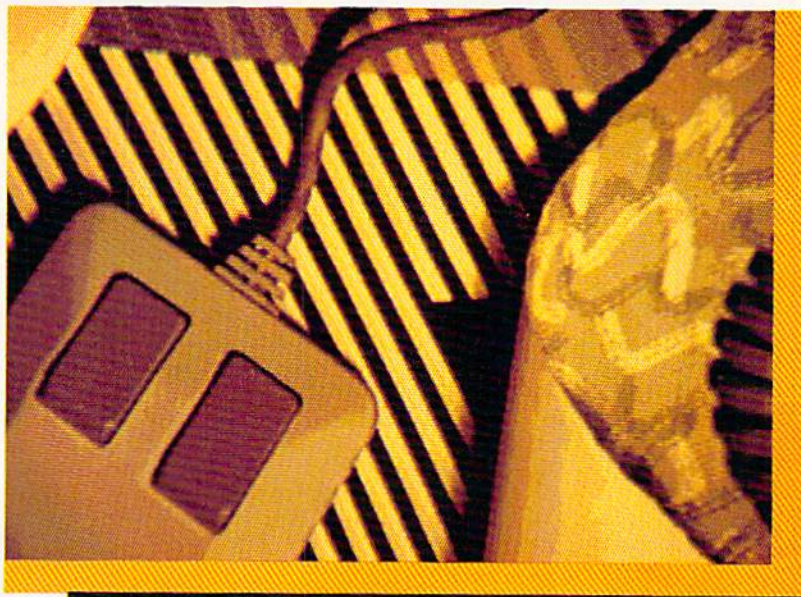
A byproduct of this is that *Swiftcalc* files cannot be read by *Swiftsheet*. However, that is a small price to pay for a spreadsheet that works fast, displays 80 columns, supports keypad entry—and doesn't cost a bundle. **C**

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**AMIGA INTUITION
REFERENCE MANUAL**

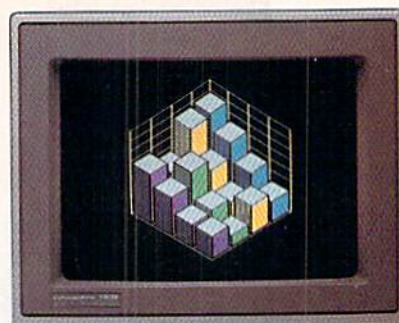
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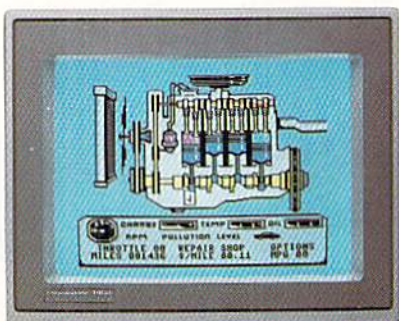
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Karateka

Computer: Commodore 64

Publisher: Broderbund

17 Paul Drive

San Rafael, CA 94903

Medium: Disk

Price: \$29.95

If you like martial arts and arcade action, you'll get a real kick out of *Karateka*. You'll also get your fill of body blows, karate chops, bruises, claws, and puncture wounds.

You are the star of a martial arts movie on a small island near Japan. When the curtain goes up, you have just finished your apprenticeship and are a master of karate—a *Karateka*.

In the movie, your village (along with your bride-to-be) has been conquered by an evil warlord. Like any good hero, you must single-handedly retake the village, destroy the warlord, and free your sweetheart.

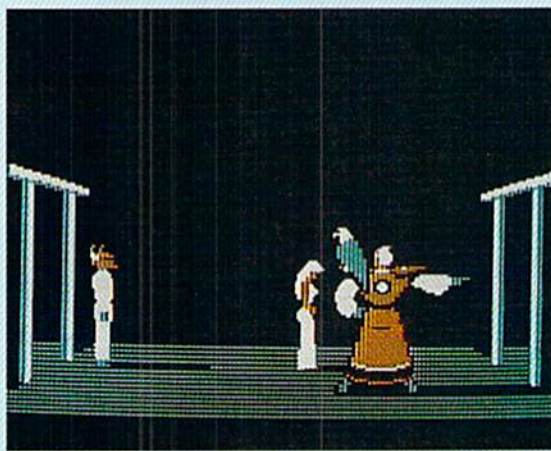
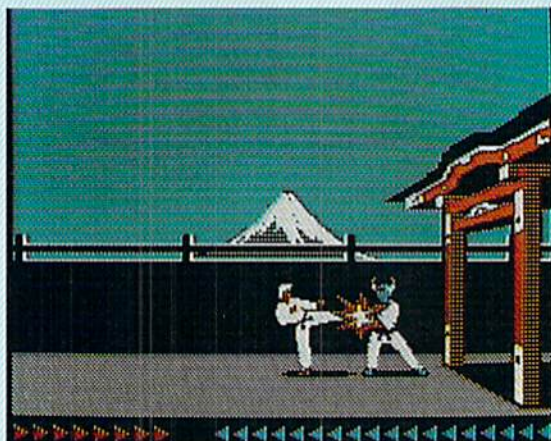
As you battle your way to the warlord, you face masked karate warriors. Study each opponent's movements carefully to determine their fighting style. Some will press the attack, while others will wait for you to advance. Some fight better with their feet while others are quicker with their hands.

The trick is to inflict damage on them using karate kicks, blows and jabs, while avoiding the same damage yourself. If you are getting the worse end of the fight, the best course is to retreat to recover. When your energy level falls to zero, you die and the movie has a sad ending.

Winning is tough, so be prepared to star in many movies with sad endings. Although defeating an individual opponent is not too difficult, defeating them all is. As soon as one guard is defeated, another comes running. Plus, as you tire from battle, you fight stronger and stronger warriors.

Another danger is running out of places to retreat. Outside the warlord's castle, there is a real danger of falling off the cliff if you step backwards. While inside the castle, walls and closed doors can block retreat. If you are tired and have your back against the wall, your foe's job is easi-

*You are
the star
of a
martial arts
movie,
but winning
is tough,
so be prepared
to star in
many movies
with
sad endings.*



er. When this happens, the phrase "having your back against the wall" gains new meaning.

This retreat feature of *Karateka* offers a bit of comedy. When the hero steps backwards over the cliff, he disappears. A moment will pass until you hear a thud. "The End" will appear and taps will sound.

The game's graphics are superb, some even bordering on beautiful. The movie theme is well promoted with realistic screens, including a title screen complete with credits and storylines that scroll up the screen to dramatic music. The displays are true to life in both color and dimension.

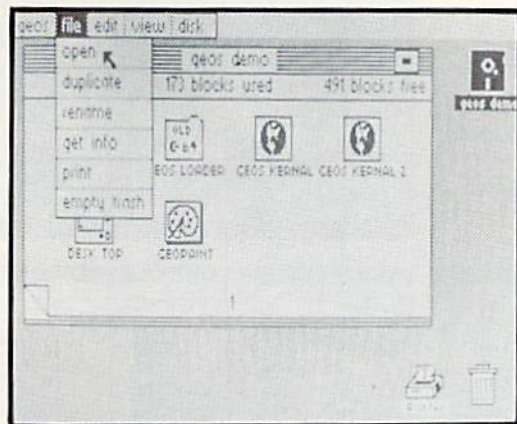
All the characters are realistic, down to the shadows they cast. Because the background displays move in the opposite direction to the character's movement, the screen gives the illusion of a camera panning horizontally. One especially well done scene shows the imprisoned bride-to-be weeping in her cell.

Most arcade games offer multiple lives, but not *Karateka*. When the hero dies, the movie ends. So to restart your conquest, you must start from the beginning, fighting the first warrior again. Those of you who enjoy the arcade action probably won't mind this challenge, but if you're in a hurry to see a happy ending, you're going to have to be very good at karate. *Karateka* does not include an option to save a game in progress.

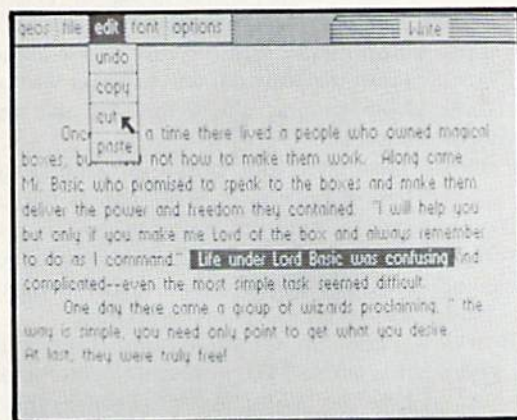
I did find one detail of *Karateka* particularly curious. Even though the story location is a Pacific Island near Japan, both the hero and heroine were blondes while their foes were all dark. But overall, if you want challenge and fast action, *Karateka* is for you. It's packed with two-fisted, hard-hitting karate. The sound effects are dramatic, and the graphics are realistic. If this were a real movie, it would be a thriller. This game has everything a good movie would—a tragic plot, adventure, fist fights and romance. **C**

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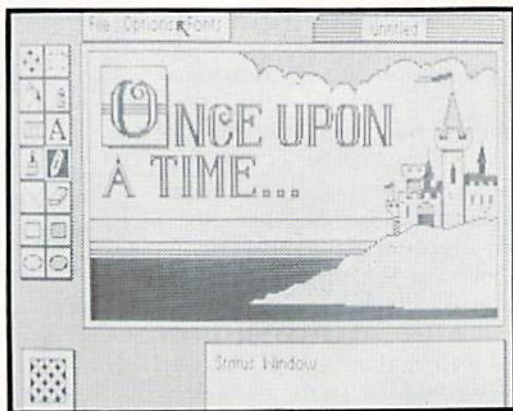
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Borrowed Time

Computer: Commodore 64, Amiga
Publisher: Activision
 2350 Bayshore Frontage
 Road
 Mountain View, CA
 94043
Medium: Disk
Price: \$29.99

The year is 1934. You're sitting with your feet propped on the scuffed top of your littered disk. The phone rings and when you answer, a voice gasps, "Sam...They want you dead..." And as the phone clicks into silence, you see a dark figure outside your window.

You are now living on *Borrowed Time*.

It quickly becomes evident that private eye Sam Harlow is both the hunter and the hunted. If the name sounds familiar, it's because he is modeled after two of the most famous private eyes of the time, Sam Spade and Philip Marlowe.

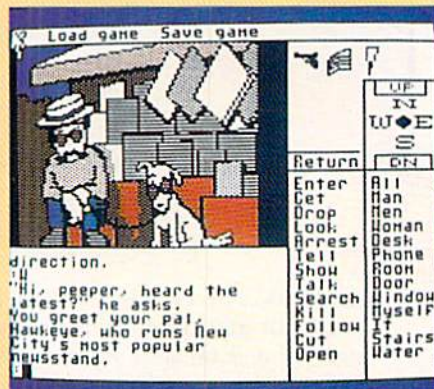
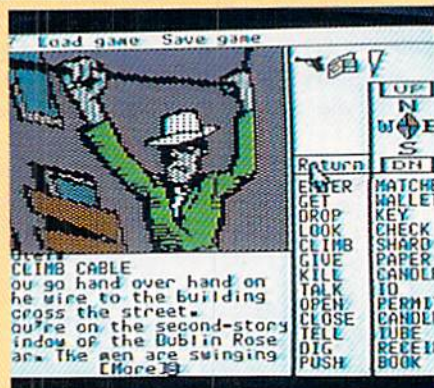
Activision has added to the text/graphics format that proved successful in *Mindshadow*. There, the graphics filled about three quarters of the screen, with the rest reserved for text. Here, the graphic scene occupies only about one quarter of the image. Below it, another quarter is used for typing text.

The right half of the screen lists key words, an option that makes it quick and easy to enter simple commands with a joystick. Select a verb from column A and a noun from column B, press RETURN, and the command is executed. Do keep in mind, however, that if you choose to play the game this way, you'll miss the richness of the parser.

Above the command columns is an area preserved for inventory, showing icons of the things you pick up along the way, as well as a compass for direction commands.

Although limiting graphics to only one-quarter of the screen may seem inadequate, it is not. The scenes are clear and sharp, making it easy to spot the visual clues. And not content with

The real joy of Borrowed Time is being Sam Harlow, moving through a rich environment as a 1930's private eye.



static scenes, the designers have put a small amount of animation into almost every frame.

Pressing RETURN at any time during the game will flip the scene out of the way, allowing you to review previous moves. Why did Iris tell you Rita had been kidnapped, yet Doris told you she had seen her that morning walking and talking happily with Fred Mongo?

Don't overlook the fact that you have somewhat better than average abilities, as did all the private eyes of that period. You can be sapped—and probably will be—and come out of it with not much more than a good headache.

Being shot, however, is permanent. Who was behind you when you heard the click of a revolver being cocked? To guard against sudden death, *Borrowed Time* has a quicksave feature. Just before making a dangerous move, hit the F7 key and RETURN. The game up to that point will be saved. Upon restart, pressing F8 and RETURN zips you out of your grubby office and plants you where you were just before you got killed.

Borrowed Time uses both sides of the disk. Side A is a boot routine and "living tutorial." If you've been there before with *Mindshadow* or *Tracer Sanction*, you may skip the tutorial by flipping the disk directly to the game. If not, the tutorial will instruct you on how to play the game and use the parser.

As with the previous games, the parser here is exceptional. It understands compound commands so you can communicate in real sentences and questions, rather than having to use an exact two-word phrase.

Plan on spending some time with this game. Take notes and make maps. Like any good text adventure, there are many paths to be explored and many characters to deal with before you solve the mystery of who's trying to kill you and why. The notes will remind you which character gave you particular information and the maps allow you to retrace your steps.

The game gives you your money's worth, of course, but the real joy is being Sam Harlow, moving through a rich environment as a 1930's private eye.

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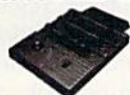
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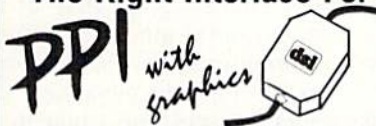
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Steinman Spreadsheet and Report Generator

Computer: Commodore 64
Publisher: Loadstar
 P.O. Box 30007
 Shreveport, LA 71130
Medium: Disk
Price: \$29.95

Who says good software for the Commodore 64 has to be expensive? Who says a mathematical spreadsheet requires an accounting degree to understand? Who says the same program used to compute the team's bowling averages can't provide comparisons of the future value of six-figure investments or prepare business reports?

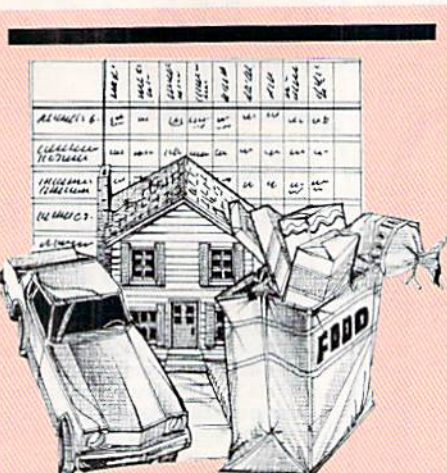
Certainly not Barbara Steinman, Certified Public Accountant, Commodore 64 devotee, and author of the *Steinman Spreadsheet and Report Generator*. Certainly not the people at Loadstar, the publishers. And certainly not yours truly, cheapskate and new user of the *Steinman Spreadsheet and Report Generator*.

What is a Spreadsheet?

To get a good idea of exactly what a spreadsheet is, imagine a simple family budget. If we calculate our monthly income, rent, and utilities, we can determine how much will be left for the luxuries of life, such as food and computer disks. Label four lines on paper income, rent, utilities, and remainder, then label the columns with months.

When you spread the numbers across this sheet of paper, you have created a spreadsheet. As your income or expenses change, you erase numbers and enter new ones. And by recopying the data onto a fresh piece of paper, you can add new expenses like car payments or alimony. Of course, every change means that the remaining entries will need to be recalculated.

An electronic spreadsheet, such as the *Steinman Spreadsheet*, is the



For \$29.95, you get a full-featured, simple to use spreadsheet that can handle many personal and small business needs.

same thing, except that all the lines (rows) and columns are in the RAM of a computer rather than on paper. This has the obvious advantage of saving paper, erasers, and calculator batteries, and also allows you to play "What if?" by changing numbers and instantly viewing the recalculated results. You might fear that setting up and using an electronic spreadsheet is difficult, requiring a higher education in mathematics and the memorization of thousands of computer commands, but this is not the case with the *Steinman Spreadsheet*.

Steinman Spreadsheet to the Rescue

The *Steinman Spreadsheet* makes sense out of confusion. The 60-page manual thoroughly explains all the commands. In addition, a command summary chart is provided so you don't wear out your thumb looking through the manual.

You are presented a simple menu with the choice of the spreadsheet, report generator, dimensioning module, and disk commands. The manual guides you through the simple process of formatting a disk the first time you use the spreadsheet, naming and

dimensioning your spreadsheet. You are then presented with a blank spreadsheet form. A chapter of the manual defines the status symbols.

Loaded with Features

Steinman included just about every feature you might want, and certainly some that only an accountant who works with spreadsheets on a daily basis would think of. All the standard features are here: column width selection, color selection, data formatting, use of formulas and labels, column or line insertion or deletion, editing of information, copying lines or columns, moving lines or columns, replication, saving a spreadsheet, loading a spreadsheet, printing the data, and disk commands.

Some of the less common, but extremely useful, features include selection of the degree of precision for calculations, representation of negative numbers with your choice of either a minus sign or enclosure in parenthesis, and the choice of whether or not to display commas after every third digit. These features can be set globally, which means that all data cells on the entire spreadsheet behave the same way, except any particular data points whose parameters can be overridden simply by specifying new parameters for these cells.

The *Steinman Spreadsheet* can page through the spreadsheet a full screen at a time, go to a specific location, "fix" your titles (line labels and column headings) so that they always appear on the screen regardless of where you are in the spreadsheet, and has sum, minimum, maximum, average, and count functions. The program also features IF-THEN-ELSE logic in formulas, the ability to redimension (change the size of) your spreadsheet if you underestimated your needs, change the order of calculation, and even escape from any mistakes in using the commands. These extra features really make using the program a breeze. Some of these features are found on minicomputers and mainframes, but are seldom seen on microcomputer spreadsheets.

Report Generator

One of the goals of a spreadsheet is

Continued on pg. 40



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SOFTWARE REVIEWS

to print out the results in a standard form. Most spreadsheets allow you to print out the whole sheet, but the *Steinman Spreadsheet* contains a separate program module that makes report generation simple. The Report Generator walks you through seven pages of menus which provide every option you need for preparing any kind of report you want.

You can enter headings and footnotes that will print on each page of the report, and select the style and location of page numbers, if you want them at all. You can select column width, margins, and number of lines

You can enter headings and footnotes that will print on each page of the report, and select the style and location of page numbers, if you want them at all. You can select column width, margins, and number of lines per page, and which columns of the spreadsheet you want to print and in what order. You can select which printer device number and secondary address for output or you can output to disk to include the report in a word

processor file. Once you've made these decisions, you can save the printing format to disk.

Shortcomings

This spreadsheet has its shortcomings, though they are few and most noticeable to those who are used to more expensive spreadsheets. First, the spreadsheet is a bit slow when repainting the screen. This could get annoying when moving around a very large spreadsheet.

Secondly, the manual, as good as it is, would have benefited from using an example spreadsheet. In learning a complex program such as this, it would be a great help to the novice if the program disk included a simple spreadsheet, such as a budget, to step the user through all the commands.

But most importantly, the Copy and Replicate functions are unusual. "Copy" copies only entire lines or columns of data. It is not possible to copy a much narrower range of data into another area of the spreadsheet. The "Replicate" function copies data

from one cell (the source) to a range of cells, changing cell references in formulas as it goes. However, the data must be replicated to a series of one or more cells in a continuous line beginning with the source cell. So it is not possible using either of these commands to copy data from line 3 column 2 to the range of cells in line 5 from column 5 through column 8. The copy and replicate functions are adequate about 60% of the time, but some users may eventually want more flexibility.

Good Buy

These minor deficiencies are greatly overshadowed by the many features and the low price. For \$29.95, you get a full-featured, simple to use spreadsheet that can handle all of your personal and small business needs, including customized and complete reports and generation of disk files for use with your word processor. It's like having your own accountant working for you day or night, right in your own home! **G**

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Team Mate

Computer: Commodore 64

Publisher: Tri Micro
14072 Stratten Way
Santa Ana, CA 92705

Medium: Disk

Price: \$49.95

Team Mate consists of four programs: a word processor, a data file manager, a spreadsheet, and a business graphics program. All programs are integrated; that is, data can be exchanged between programs.

Word Processor

The word processor in *Team Mate* has a capacity of 77 columns by 99 lines. This is about one and a half pages of single-spaced printout. While this is a rather small workspace compared to other programs, you will find that it can be overcome by file linking. File linking "stitches" the end of the current workspace to the beginning of the next. You can then print out the entire work or just the current section.

Unlike many word processors, this one is full width. By that I mean that you will only see half of the width of your text at one time. You can jump back and forth from the left side of the page to the right side by using the function keys F7 and F8.

The word processor, as well as the file manager and spreadsheet, use keyboard commands. This means that you will not have to trudge through menus. Don't get me wrong: Though menus can be very friendly, in this type of software I find it much more productive to be able to call up a function immediately rather than through a menu. The F1 key puts all the commands at your disposal. These include bulk delete, search and replace, file merging, the use of tabs, moving blocks of text, inserting text, on-screen print previewing, left and right justification, page numbering, and file linking.

The print mode imbeds print-format commands in the document for underlining, centering, and the ability to send certain ASCII codes to the printer. Most of the commands used by the processor are either recogniz-

The real power of the spreadsheet is its ability to interact with the word processor and file manager programs.



able words like pause, justify, and nextpage, or abbreviations of the function, such as fd for format disk or dl for delete. This system makes learning to use the processor very easy.

File Manager

The file manager is as easy to learn as the word processor. Fields within a file can be named (up to 35 characters) with up to 38 characters in each of up to 17 fields per record. Sorts are

allowed on up to three fields within a record, and accessing records is as easy as pressing F1 and typing RC and the number of the record you want. Searches and record updating are a snap, and you can even copy records from one file to another.

The real fun begins when you want to create a form letter. First you insert a variable name in the letter and then use the mail merge function of the file manager to integrate the letter and the database file. When you do this, you must have both the word processor and the file manager resident in the computer at the same time. There is an option for this at the beginning of the loading procedure, so you can jump back and forth between the two programs in less than the wink of an eye by typing only two letters. No disk access time, no waiting.

Spreadsheet

The third program is the spreadsheet program. This is the real workhorse of the package. Large chunks of data can be organized, manipulated and calculated to provide answers to complex financial questions. Expense reports, profit and loss statements, checkbooks, stock tracking, and budgets can all be easily handled. The only shortcoming of the spreadsheet is its limited memory capacity. The size of the sheet is 17 columns by 50 rows, only 850 cells maximum.

The real power of the spreadsheet is its ability to interact with the word processor and file manager programs. If you select the desktop option when loading the system, you can have all three programs inside the computer at once. You then have the ability to have a split window on the screen which displays the word processor data at the top and the spreadsheet data at the bottom.

The ease with which data can be moved from the spreadsheet to the word processor is amazing. Single cells can be mapped into the processor as well as whole sections. Names as well as formulas can be applied to cells, and you can go to a cell by using its name rather than its address.

There is another function within the spreadsheet as well as the file manager that allows you to repeat

Continued on pg. 126

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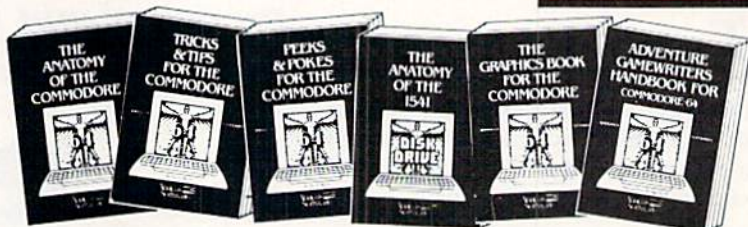
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Reference Books



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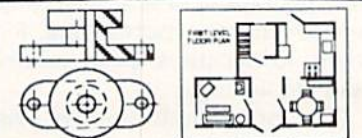
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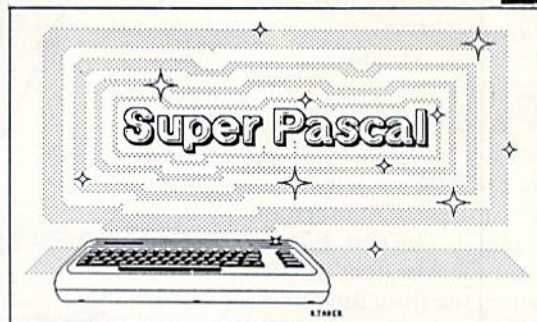
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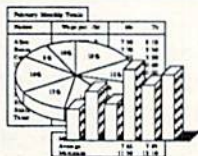
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Proteus

Computer: Commodore 64
Publisher: Research Design Associates
 P.O. Box 848
 Stony Brook, NY 11790
Medium: Disk
Price: \$79.95

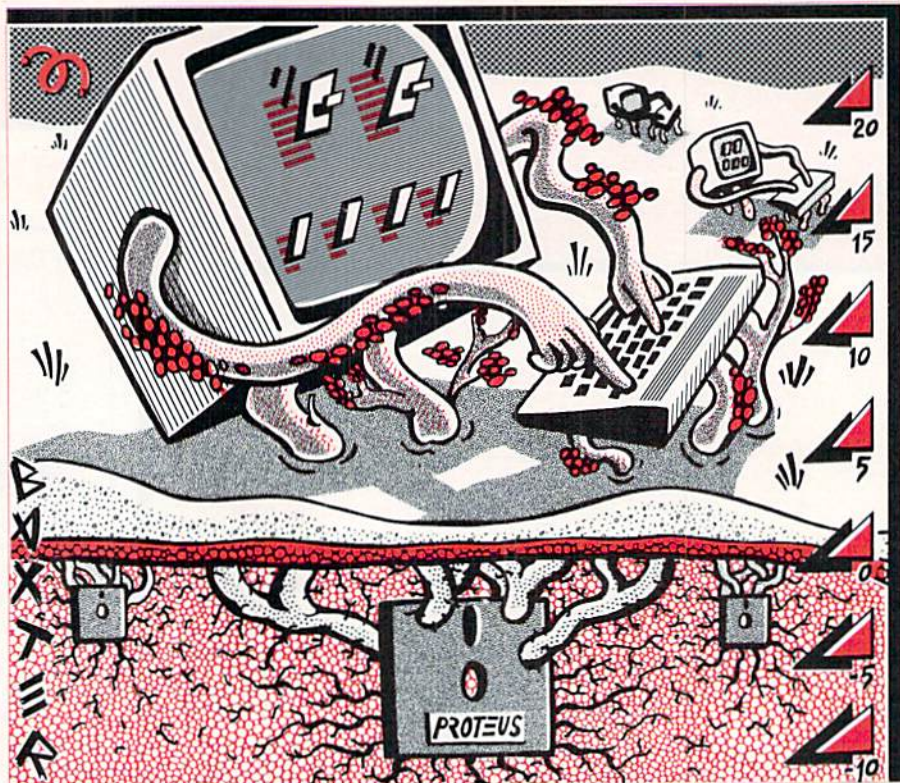
What a concept! I load my word processor, tingling with anticipation. Three false starts later, I stand in the kitchen munching on a cold piece of last night's chicken. I am uncomfortably aware of that blinking cursor taunting me from the other room, and of all that blank space around my two solitary sentences. Maybe it wasn't such a great idea for a story after all. And so, another terrific idea bites the dust.

What went wrong? For most of us, the biggest problem with writing is not the original idea. The problem is what to do with it once you've got it. How do you transform that tiny seed into a full-blown plant? What's the secret ... the magic ... the tool? The secret is "pre-writing." The magic is "free writing." The tool is *Proteus*.

Proteus. Sounds familiar. Isn't *Proteus* that weird soothsayer from the annals of Greek mythology who could change his shape at will? Right. But wrong *Proteus*. I'm talking about the pre-writing idea processor from Research Design Associates. Nevertheless, one point regarding *Proteus*, the Greek myth, has bearing on the theories behind *Proteus*, the software. It was because of his shape-shifting that *Proteus* became acclaimed as the personification of the "original matter from which all the world was created."

Whatever you write—be it an essay, story, poem, song or novel—your ideas are the original matter from which your creation is made. Unfortunately, original matter without a blueprint doesn't really matter. To put it bluntly, a terrific idea, unexplored, will remain merely a terrific idea.

To reach its potential, an idea must first be plundered: mercilessly fragmented into its most elemental ingredients and then rearranged, brainstormed, subtracted from, added to, adjusted and rearranged again—until



Proteus helps writers of any age or expertise transform the tiny seed of an idea into a full blown plant.

all the bits and pieces fall magically together with a purpose and a point.

It is in this process of breaking down and breathing life into an idea that *Proteus* comes along. *Proteus* is comprised of five interactive modules: "Listing," "Freewriting," "Looping," "Cubing," and "The Five W's."

"Listing" allows you to create numbered lists of thoughts and information. This is the place to begin. If you already have the idea, "Listing" allows you to explore what you already know about your topic, "road map" possible twists and turns, or outline the basic structure of your manuscript. "Listing" can also be used to clarify individual elements.

"Freewriting" is what it sounds like. When you freewrite, it is important not to pause or ponder. On the contrary, it is very important to refrain from any kind of self-censorship—just type whatever comes into your head, as quickly as you can, without concern for correctness or content. To help keep the ball rolling, "Freewriting" chimes and flashes the message—KEEP WRITING—if you pause for more than ten seconds. However, you can hit the F1 key to take a breather.

The "Looping" module allows for revision and expansion on ideas created by "Freewriting." It allows you to zero in on any particular thought within a freewriting file, and then freewrite on that concept by itself.

"Cubing" is a way of looking at a subject from six different angles. You can start with a new idea or select a topic from previous work within any other module. After you name your cubing session, you will be prompted to analyze. As with the other modules, type in whatever occurs to you. Keep in mind that there are no right or wrong answers, only free-flowing, spontaneous thoughts. When you are done analyzing, you are prompted to freewrite the other five sides of the

cube: compare, contrast, argue for, argue against, and define.

The last *Proteus* module is called "The Five W's." Here you answer the five primary questions: who, what, when, where, and why. In this module, again, you answer each question, writing down everything that pops into your head, using the free-flowing freewriting technique. This module clarifies the structure of a given topic.

Proteus is extremely easy to use. The entire program uses just three command keys, so learning to use *Proteus* takes about ten seconds. It is also extremely flexible, allowing you to move back and forth from one module to another, and from one topic to the next and back again, as often as you wish. And while you're busy with all this shifting around, you never have to suffer the agonies of forgetting to hit the "save" key, because there *is* no save key—*Proteus* saves all text from every module *automatically*.

This program is so good that the few criticisms I *do* have don't affect in the least my overall highest recommendation. The 40-page manual covers pre-writing techniques thoroughly, but its format is somehow unaesthetic. Fortunately, the abundance of truly helpful help screens that explain and exemplify all *Proteus* modules in great detail makes the manual more or less extraneous.

I have no problem whatsoever with the fact that *Proteus* does not allow you to produce a final draft. Writing is basically a three-phase undertaking: pre-writing, writing, and re-writing. *Proteus* creates the ideal structure and environment for the first pre-writing phase. Let your word processor take care of phase two and three. My only regret is that, although *Proteus* lets you print out your work, there is no facility for transferring your *Proteus* files into your word processing program. This particular convenience would make the transition from pre-writing to writing more fluid.

(Editor's Note: Users can, however, upgrade to a version that *will* transfer to your word processor.)

From student to up-and-coming novelist, *Proteus* is without a doubt an invaluable tool for writers of any age or expertise. C

Paul Whitehead Teaches Chess

Computer: Commodore 64

Publisher: Enlightenment Inc.

1240 Sanchez St.

San Francisco, CA 94114

Medium: Disk

Price: \$49.95

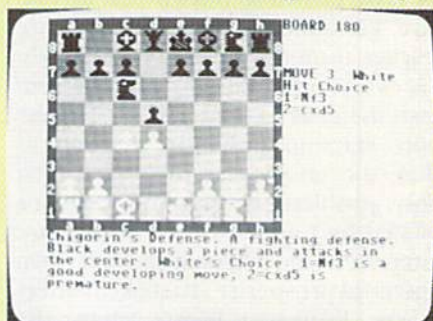
Chess is intriguing. This is especially true when a pair of masters like Anatoli Karpov and Gary Kasparov get together. But there are many people who know very little of the subtle strategies of the game, and still more who know absolutely nothing about it. This program starts with the very basics of chess and builds to an intermediate level. Paul Whitehead, who designed the tutorial, was a chess master at 15. That was almost ten years ago. Since then, he has won state, junior and American championships. In this program, he successfully lays the groundwork for a novice chess player without being condescending.

There are three disks in *Paul Whitehead Teaches Chess*. One contains the "Coffeehouse Chess Monster," an opponent program by Julio Kaplan, a chess programmer and champion himself. The other two form the tutorial, which covers the basic rules, tactics for each piece, opening principles and endgame. Quizzes are provided to test your understanding.

Many of the more than 600 different boards offer you choices based on the teachings you have received to date. When the right move is made, you are applauded, but when you make a wrong move, you are shown the consequences of that move and why it was wrong. Each of the 600 boards is selected from menus. Each menu requires disk access, as does each board. So, by the time I had seen all the boards from both disks, I had spent a lot of time waiting for my drive to do its job.

In spite of this, the program is very informative and generally easy to use. The chess pieces are well drawn, so there is little chance of confusing one

Start with the basics of chess and move to an intermediate level. Then test your skill on an opponent program included in the package.



with another. The game program is set up so that you can create any board situation found in the tutorial, play it out, and then return to your place in the tutorial. Each chess piece is assigned a point value. This makes it easier for the beginner to see if a swap of pieces would be an advantage or disadvantage. Standard notation is also taught, and with a printer, that notation can be recorded for all your games. Since each move is generated by keyboard entry, it is imperative that you understand standard notation, because those are the instructions you'll be typing.

Once you feel you're ready to face competition, access the "Coffeehouse Chess Monster." This computer foe has nine different levels. The computer can play you or play itself. It is also possible for two humans to square off. You can un-do any moves made by you or the computer. Those can then be replayed.

The documentation is good, especially the road maps telling where each board is located by both number and subject, and then letting you call up any board. The actual rules and procedures can be found on four pages of "All You Need to Know." But there is much more you'll discover on your own.

Overall, the program is for those who have the burning desire to learn chess from square one. C

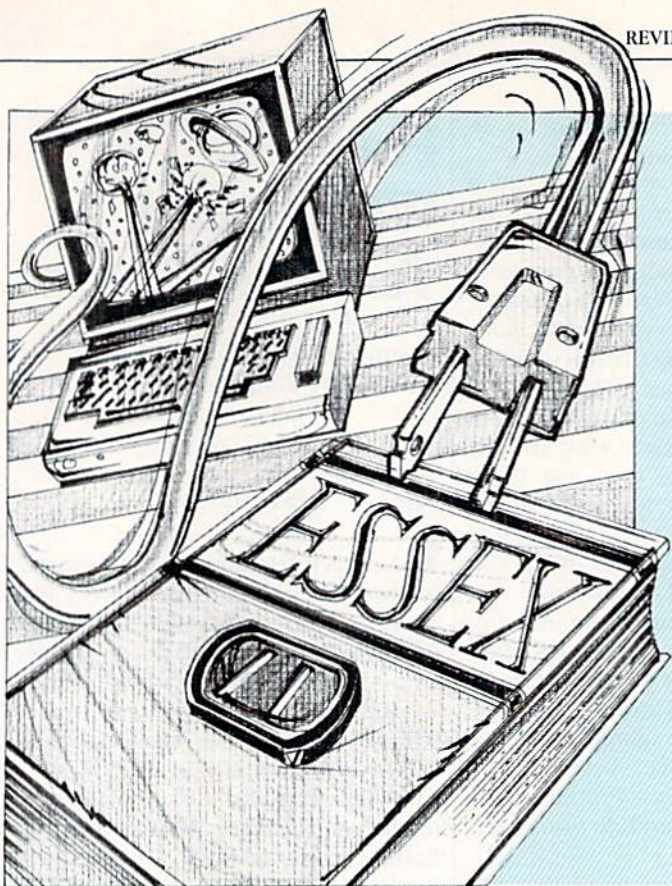
Essex

Computer: Commodore 64
Publisher: Synapse/Broderbund
 17 Paul Drive
 San Rafael, CA 94903
Medium: Disk
Price: \$39.95

Those of you suited for text adventure, get onboard. The Vollchons are tearing through the universe, crushing everything in their path. The Federation needs a counterattack, but the only starship powerful enough to slow the invasion is the *Essex*. The only problem is that the *Essex* is owned by Captain Dee, a man more interested in personal profits than universal prosperity. To make matters worse, Professor Ignatz Klein, the only man who can devise a defense, has disappeared. Your job is to board the *Essex*, find its reclusive captain, and persuade him to join the fight. Of course along the way, you must capture a Vollchon saboteur before he destroys the ship and find Klein before he is eaten by ravenous cannibals. So try not to be killed—the Federation needs you.

If you enjoy a good book, *Essex* will quickly become a favorite. Its intriguing plot has more cliff hangers than a James Bond movie and more space drama than *Star Wars*. Because *Essex* spins its tale in real time, things happen regardless of your actions. This real-time action is a welcome advancement in adventure novels. In early novels, action is frozen until the novel receives a command. Not so with *Essex*. Unless you tell the story to pause, it will continue without you. This not only keeps the action flowing, but helps solve mysteries as well. If you are ever unsure of what to do next, your best move might be to simply do nothing. Just wait for another character or background event to give you a clue.

Older adventure games often restrict the user to few commands. But because *Essex* uses Synapse's advanced parser, the program can understand most words. In fact, *Essex* will answer almost any command with a logical response. This really adds enjoyment, because now you



To complete the mission aboard Essex, you must be a cross between James Bond and Luke Skywalker.

can spend your time reading instead of checking the list of commands. If you do input a command the computer doesn't understand, it will point out the error and suggest how to rephrase it. And because you can use synonyms freely, you can tell Nancy to "pick up," "get" or "take" the newspaper.

All the features you expect in a good adventure game are here. You can save your spot in the novel using the Bookmark command, and your character can pick up and drop objects, examine surroundings, and check on health, inventory, and belongings. For a printed record of your progress, use the Printer On command.

But above all, *Essex* is an adventure. After reading the first five chapters of

Essex, you are ready to board the starship. On board, the story unfolds quickly. It begins with a murder. Be careful investigating it, because if you act hastily, you may be the second victim. Now work your way to Captain Dee. I found that sneaking into the crew's quarters and stealing a uniform gave me the most freedom to explore. But it also got me thrown in the brig when I was discovered. A malfunction to the energy forces there nearly killed me—and that was only the beginning!

Essex's one flaw is lack of speed. The game itself is stored on three sides of two disks. To accommodate the complexity of *Essex* and keep the real-time clock ticking, the computer's memory must be continuously updated. This is done by accessing the disk. As a result, short waits must be endured while the drive spins.

Essex is an electronic novel for anyone who enjoys adventure. It creates a universe filled with challenge and danger. If a movie was ever made from this novel, it would be a cross between a 007 movie and *Star Wars*. In fact, to complete the mission aboard *Essex*, you really must be a cross between James Bond and Luke Skywalker.

G

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Help Master 64

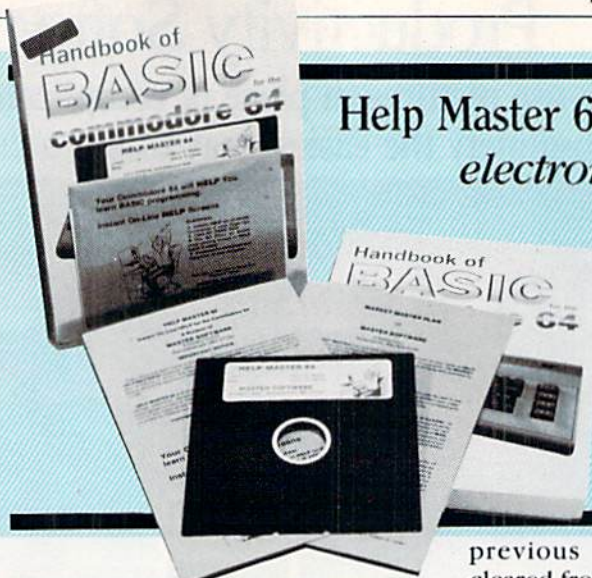
Computer: Commodore 64
Publisher: Master Software
 6 Hillery Court
 Randallstown, MD 21133
 301-922-2962
Medium: Disk/Tape
Price: Help Master 64: \$19.95
Handbook of BASIC on the Commodore 64:
 \$14.95
 Both: \$24.95

How often have you forgotten BASIC commands in the middle of writing a program? This can be very frustrating. To make beginning programmers feel at home, Master Software has developed a book-and-program package on 69 Commodore 64 BASIC commands. With *Help Master 64*, a programmer can call a BASIC command to the screen along with its Commodore abbreviation, up to three lines describing the command, and further page references.

This electronic reference guide is simple to use. A title screen appears with an option to either read the instructions or exit to BASIC. The instructions remind you of how to use *Help Master 64*. When you exit to BASIC, a listing of all Commodore 64 BASIC commands appears and you are ready to enter your program.

If, while typing your BASIC program, you forget the format of a BASIC command or what a command will do, just type a quotation mark and press RETURN. The entire list of commands appears immediately. If you find a command you would like *Help Master 64* to explain, type a quotation mark followed by the command and the RETURN key. A window is displayed at the upper portion of the screen with the BASIC command highlighted, its Commodore abbreviation, an example of the correct usage of the command, an explanation of the command, and page references in three different programming guides, one of which can be bought with the *Help Master* program or purchased separately. The example also displays options for use of the command within brackets.

When you have read the informa-



Help Master 64 is an electronic reference guide to 69 BASIC Commands on the Commodore 64.

```
HELP MASTER 64 (C) 1985 J. HIEBER/S. LEVEN
A PRODUCT OF MASTER SOFTWARE
6 HILLERY COURT, RANDALLSTOWN, MD 21133
TO GET HELP, TYPE " FOLLOWED BY ONE OF
THE TOPICS LISTED, THEN PRESS (RETURN).

ABS EXP LET PRINT STATUS
AND FOR LAST PRINT
ASC FOR LOAD PRINT
ATM FOR LOG OPEN
CHR$ GET MID$ RESTORE
CLOSE GET$ NEW RETURN
CLR GOSUB NEXT RIGHTS
CMD GOTO NOT RUN
CONT IF ON RUN
COS INPUT OPEN SAVE
DATA INPUT OR UN
DEF FN INT PEEK
DIM LEFT$ POKE
END POS
AND KEY$ LEFT$ POS
```

```
HELP MASTER 64 (C) 1985 J. HIEBER/S. LEVEN
GOSUB ADDRESS: 60 11111 S
SYNTAX: GOSUB [line]
TRANSFER CONTROL TO LINE NUMBER SHOWN.
WHEN SUBROUTINE ENDS CONTROL RETURNS TO
STATEMENT AFTER GOSUB.
GUIDE: 120 121 122 123 124 125 126 127 128
F1=RESTORE SCREEN KEY=EXIT F2=HOME
1640 IF CC=200101870
1645 GOSUB 1645:GOSUB 1645:GOSUB 1645
1647 IF VAL(L$)>5 THEN GOSUB 1645:GOSUB 1645:GOSUB 1645
1650 FOR J=1 TO 4:IF L$=CLG(J) GOTO 1665
1660 NEXT J:GOTO 1670
1665 IF J=3 OR J=4 OR J=5 OR J=6 OR J=7 OR J=8 OR J=9 OR J=10
=4560102130
BREAK
READY
GOSUB
```

tion thoroughly, press any key to return to BASIC, leaving the help display to scroll off the screen. If you wish to restore the text that was present before you asked for help, press the F1 key to reprint your original screen.

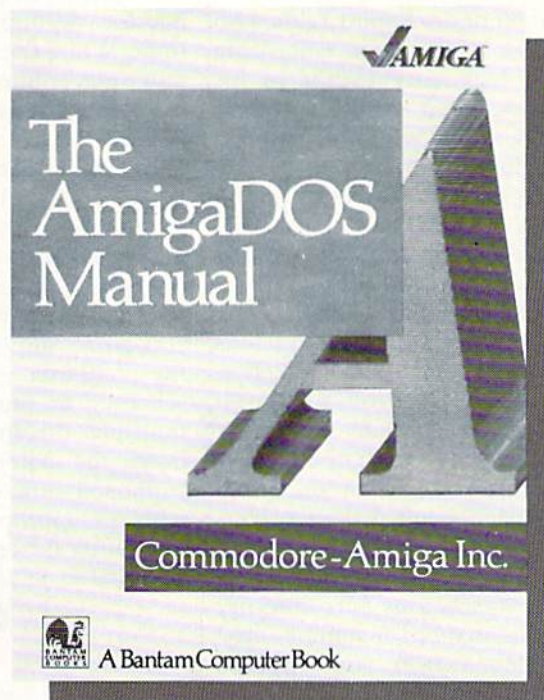
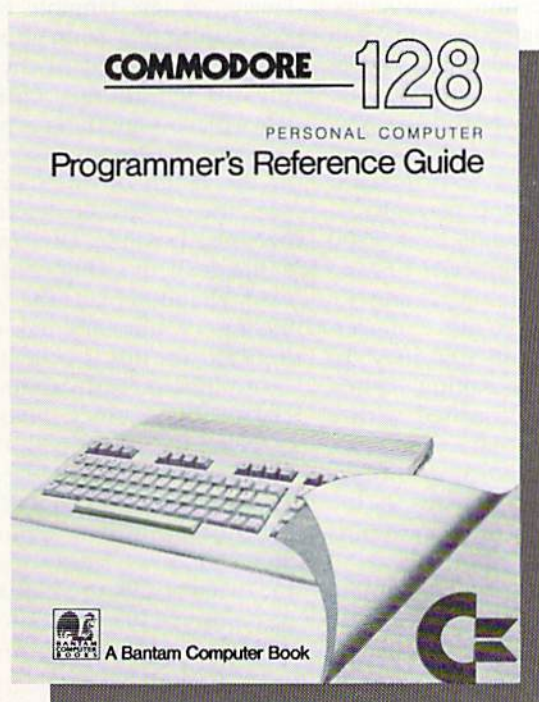
Besides retrieving helpful information, *Help Master 64* has other features. For instance, no matter how many times you press the RUN/STOP and RESTORE keys, *Help Master 64* always remains functional. In addition, *Help Master 64* includes a "C64 RENEW" program. This routine reverses the action of the NEW command. By typing "SYS51250:CLR," the

previous program that has been cleared from memory by NEW or system reset can be revived. Though *Help Master 64* contains all of the Commodore 64's BASIC commands and descriptions, the program itself uses no BASIC programming memory. *Help Master 64* is located between memory locations 40960 and 49151 underneath the BASIC ROM, and also uses part of the 4K of memory located between 49152 and 53247. However, this program does not interfere with the DOS Wedge or programs that start at memory location 52224.

Help Master 64 is not copy-protected, but Master Software's Market Master Plan is quite interesting. In an effort to prevent piracy, they suggest that when your friend asks for a copy, offer him an order form which has a serial number stamped on it. This serial number is an account number. Every time a friend buys *Help Master 64* and sends in the order form you gave him, Master Software then puts two dollars in your account. In addition to the two dollars you receive, for any copy of *Help Master 64* your friend "sells," you receive an additional dollar. Your account grows until it reaches ten dollars and Master Software sends you a check.

Help Master 64 is extremely helpful for beginner programmers and for those programmers who despise sifting through dozens of manuals. With the new Commodore 128 growing in popularity, there is little doubt that Master Software will create a newer version that will support all the 128's BASIC commands. For whatever computer, *Help Master 64* is truly a useful reference guide.

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Brimstone

Computer: Commodore 64
Publisher: Synapse/Broderbund
 17 Paul Drive
 San Rafael, CA 94903
Medium: Disk
Price: \$39.95

Times have never been better for text adventurers. Synapse/Broderbund's attempt at tackling the revered medieval world of demons and dungeons is as good as they come.

Brimstone is the tale of Gawain, a lesser Knight of the Round Table who spends most of his time fantasizing about the legendary events of his more experienced brethren. Then, one fateful night, with the complacency of a full stomach and the soothing sounds of a nearby lute, Gawain falls into a deep, hypnotic sleep. He unknowingly drifts into a dark and enigmatic underworld known only as Ulro. A prisoner in the unforgiving fires of his own dream, the player—as Gawain—must traverse this treacherous underworld to search for a well hidden mystical secret: five magically related words which will free him.

The struggle begins in the package's 100-page book, which orients the player to both the story line and the gaming rules and guidelines. The book is a marvelous introductory tool, a combination of humor, mystery and drama. Here you will read the fictional account of how the Albion Manuscript—that long lost volume which retells "The Dream of Gawain," the tale on which our adventure is based—was absconded from the lower stacks of the Slog Archives, shipped to California, and finally transformed into an electronic format.

You will also be treated to an Ulro character directory to get acquainted with the land's more distinguished inhabitants, as well as a hilarious "warning" chapter from the Programmer General concerning the addicting qualities of this package. There is also the address of the BUBLES foundation (Bystanders Upset by Brimstone-Like Electronic Software), for those who feel compelled to send donations.

Experienced text adventurers will immediately feel at home with the required itinerary. The computer un-

Gawain's dream becomes a nightmare, where he traverses a world of demons and dungeons in search of mystical secrets.

folds a small portion of the overall tale, including location, characters, movement, and dialogue, and then asks for your input, as Gawain, to continue. While the action/reaction computer-player interplay is nothing new, the Synapse team has successfully enlivened the old exchange to make it more sophisticated, and playable.

Brimstone understands over 1200 words. While this number is becoming increasingly common among sophisticated adventures, more impressive is the program's ability to recognize implied meaning. When the computer is approached with a sentence or phrase that could have multiple interpretations, it breaks down the statement, guesses at the supposed aim, and then responds with an appropriate reply.

Another intriguing play concept incorporated in *Brimstone* is the way

time passes with or without Gawain. This adds a dimension of strategic realism that pull the user deeper into its captivating environment.

For this reviewer, an equally attractive ingredient to this particular electronic novel is the fact that 99% of the scenario takes place in the surrealistic stage of a knight's dream. This allows flexibility in the story's plot construction, with unusual and unexpected locations and creatures surfacing with every turn of the "page." A less tangible element also comes into play soon after the adventurer realizes that in the mind—the theatre where this entire episode takes place—anything is possible. The dangers of Ulro are real enough, but in the realm of one's own imagination, the impossible defense suddenly becomes possible. Dive off a cliff, spit at the devil, or swing your sword with wild abandon. Let the exuberating feeling of unrestrained courage intoxicate, for this is your dream.

Any power rush gained is superficial, of course, since the designers are actually directing you through the novel on an undetectable leash. Make a wrong turn and you will be led back to your stumbling point. Yet this guidance is so subtly executed that the player will think that he is the inspirational mastermind. C

Cracking the Brimstone

Don't worry, I won't spoil the fun by revealing the secrets of Ulro. I'll leave the hard part up to you. But before going off to explore this foreign land, there are a few guidelines.

- In past adventures, whenever a player reaches a location for the first time, he thoroughly strips the area in search of clues. In *Brimstone*, this still stands, but with the ever-changing nature of the program, once is not enough. Whenever you return to an area, check around for anything that might have been stolen or deposited. While you were out, someone may have tried to leave you a message.

- While on the subject of Gawain's surroundings: Whenever you meet an impossible impasse, it pays to be patient. Since the world continuously shifts around you, sit tight for a moment or two, and see if natural events lend a helping hand.

- Keep your lips loose. Characters will constantly drift around the underworld. Whenever you establish contact with anyone, drill them with every imaginable question. These inhabitants have been placed in Ulro to be of help, and are your primary source of information. Don't be shy.

- Even with its expansive vocabulary, the game occasionally answers illogically. This is usually due to misinterpretation somewhere along the line. But while these statements might be incorrect, they are not useless. Take note of the given reply, because it is most likely a clue to a similar situation in the future. As a matter of fact, the shrewd explorer might want to intentionally riddle the computer with an occasional absurd or vague query. Who knows what information might be mistakenly disclosed? C

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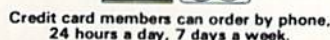
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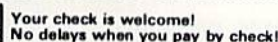
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S'more BASIC

Computer: Commodore 64

Publisher: Cardco

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Wichita, KS 67202

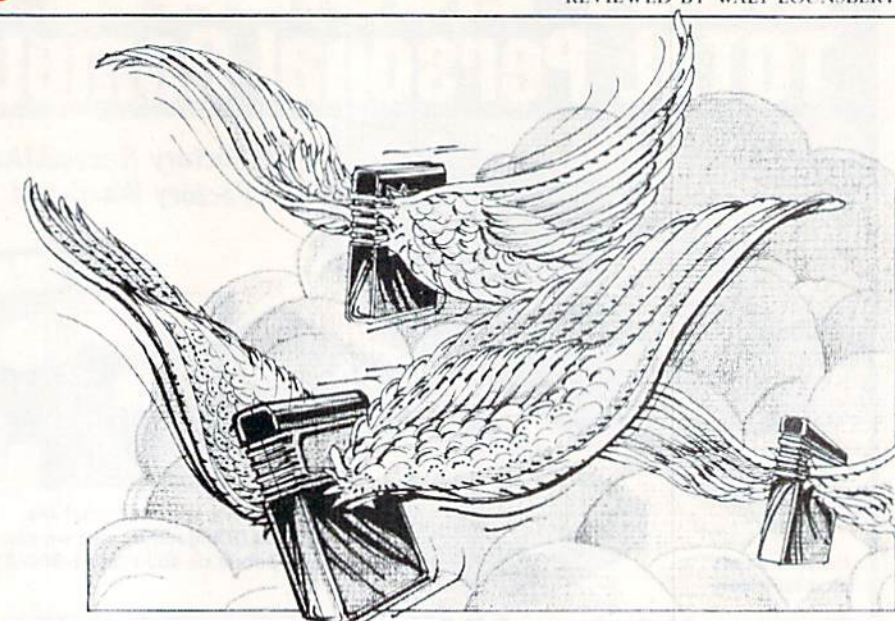
Price: \$59.95

Cardco's *S'more BASIC* is a cartridge for the Commodore 64 that not only adds BASIC commands, but expands its programming memory to 61,183 bytes. Now you can run better education programs, because there is more memory to store lessons and responses. You can use bigger and more involved database programs. *S'more BASIC* also adds commands that ease programming, and, although it doesn't add graphics and sound commands, it does provide easy access to the VIC and SID registers.

Using the cartridge, you can scroll through program listings, forward or backward, with the cursor keys. There is a fast string garbage collection routine, so when you create 40,000 bytes of old strings, BASIC won't need several minutes to clear them. And, if you deal with the disk drives, you know how a byte of value zero stored on disk is returned as a null string when you read it back. *S'more BASIC* solves this by forcing null input to equal a byte of value zero.

If you like to program, type in programs from magazines, or just fiddle with programs wherever they come from, the *S'more* cartridge makes it even more fun. By typing the command "HELP ON," you are rewarded with a list of program lines that cause syntax errors as the program runs, as well as the error messages. You can enter programs with automatic line numbering, renumber all or sections of a program, or delete sections of a program.

You can automatically FIND and CHANGE parts of a program. If you need to find out what a program is doing, you can DUMP the values of non-array variables, or TRACE program execution. Cardco definitely thought of veteran programmers when they included hexadecimal/decimal conversion commands. In addition, a full range of function key definition com-



A cartridge for the Commodore 64 that not only adds BASIC commands, but expands its programming memory to 61,183 bytes.

mands is included, and *S'more BASIC* will allow you to include REMarks in the middle of program lines.

S'more defaults all operations to the disk drive. Even the SHIFT/RUN-STOP key combination loads and runs the first program on the disk instead of the tape drive. The LOAD command will also ignore the extra text in a directory listing. The RUN command directly loads and runs a program.

You can chain programs with *S'more BASIC*. Programs can be merged, so you can easily use subroutine libraries. You can list the disk directory without disturbing the program in memory, and can even list it from inside the program as it runs. You can then have the directory sent to the screen, printer, or RS-232. Almost all the disk operations are simplified, including relative files. It is also easy to deal with records containing colons or commas with *S'more*.

Although this may seem like a lot of commands from one cartridge, I have only described about half of them. Even at that, most of the features so far are simply conveniences; it is possible to get along without most of them. If you are writing applications programs, though, communication with the user is essential. And this is where *S'more BASIC* is the most valuable.

With the PRINT USING command, formatting output to the screen or printer is very simple. This is a true formatting capability, handling leading and trailing signs, commas, floating dollar signs, and scientific notation. As in the most sophisticated PRINT USING capabilities of any BASIC dialect, special characters like the space, dollar sign, decimal, and comma can be altered.

The PRINT AT command provides simple prompts for information for your program. Fancy screen layouts are a snap, and input can be restricted to give your programs some armor plating, as well. Naturally, *S'more BASIC* provides a simple means of clearing the screen and altering character, screen, and border colors.

Believe it or not, there is still more. If you are going to use all of the memory *S'more BASIC* provides, then it helps to have a structured BASIC to reduce the chances for errors in your large programs. *S'more BASIC* provides one of the main structured constructs: the DO WHILE or DO UNTIL loops. The EXIT command is provided to allow leaving a loop for any

special condition. The ELSE clause for the IF statement is also supported, but it must be on the same line as IF. Therefore, *S'more BASIC* does not provide multi-line blocks or CASE OF constructs. It can trap errors, though, which helps in both program development and program protection.

S'more BASIC gives you two new string functions that can locate substrings in a string or place a string inside another. *S'more* also allows you to restore the reading of data (from data statements) to a particular line number. There are a number of reserved variables that allow direct access to chips in the machine, such as CIA(x), COL(x), SID(x), VIC(x), and VID(x).

One of the best features of any Cardco product is the manual. Although they aren't the slickest productions around, they include a lot of straightforward information. They also include Cardco's telephone number on every page!

S'more BASIC's manual explains each command at length and includes a conversion chart for PEEKs and POKEs, all in about 120 pages. An appendix discusses use of machine language with the cartridge (which has a special command, MONITOR, to invoke a machine language monitor). This appendix also includes a good memory map.

Cardco has also included a demonstration disk with the cartridge, with many useful programs, as well as simple demonstrations. The most useful program is a mailing list program that can handle up to 600 entries. A public-domain machine-language monitor is provided, as is a screen dump utility. My pre-release version of the demo disk has 15 programs on it, and production versions will probably have more.

I had my doubts about the utility of programs written with *S'more BASIC*, until I learned that in a short time a compiler will be available (\$39.95) that allows running a *compiled S'more BASIC* program on an ordinary Commodore 64, without the cartridge. Now I'm anxious to put that *S'more* cartridge to use. After all, Cardco is offering \$100 for *S'more BASIC* programs accepted for their demo disk!

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Random Thoughts

Notes on Notations

This month, I want to discuss a big topic—notations—with specific applications to random numbers and to other areas of computer programming.

The Big Picture

A notation, in the narrowest sense, is a system for writing something down. Everybody has probably seen musical notation, at least in its most common incarnation of notes on a staff. You've seen Arabic numbers (0123456789) and Roman numerals (MCMLXXXVI). You've seen equations ($X = Y + Z$), and maybe more advanced mathematics.

But a notation can be a lot more. These patterns of ink on paper that you're reading right now are a notation for sounds that English speakers make to each other. And the sounds of English and other languages are notations for ideas, thoughts, concepts, and patterns of mental activity. They're for the most part completely arbitrary—unconnected with what they represent.

The key fact that makes notations interesting is that they give us power. A notation compresses big, vague agglomerations of data into a compact chunk—a chunk you can hold in your mind and link up with other chunks. A good notation makes it easy to do what's right and difficult to make mistakes in your work. And a great notation leads you on to new ideas and discoveries, beyond what was already contained in the data.

In fact, a really extraordinary notation gives one such power, in such a natural-seeming way, that you forget you are even using a notation! It becomes transparent, second nature. The most powerful notations that have evolved are the ones we constantly overlook—like language itself. And there may be even deeper notations, which exist independently of language—such as the ideas of "number," "space," and "time." As Paul Valéry said, "Seeing is forgetting the name



A good notation makes it easy to do what's right and difficult to make mistakes. And a great notation leads you on to new ideas and discoveries.

of the thing which one sees." The best notations are the ones we have the hardest time recognizing.

Down to Earth

But let's get back to the main theme of this series: random numbers and their applications in computing. I want to describe several notations that I find useful in dealing with random number distributions, so you can use them too when you need them.

P Given Q

"Conditional probability" is the name for the chance that something happens, given that something else has already occurred. There are a couple of rules which apply to conditional probabilities, and a simple notation which makes it easy to remem-

ber how to get the rules right.

A specific example will make it all clear. Suppose that there is a 10% chance for a man to be colorblind, and a 1% chance for a woman to be colorblind. In the language of conditional probability, we could say that "the probability that X is colorblind is 0.1, given that X is male." We write that as:

$P(X \text{ is colorblind} | X \text{ is male}) = 0.1$
The vertical bar is read aloud as "given." Similarly, one can write:

$P(X \text{ is colorblind} | X \text{ is female}) = 0.01$

So far, this is nothing mysterious. The vertical "given" bar looks something like a fraction sign—a "slash" that separates numerator and denominator, as in "22/7." That resemblance is not coincidental.

Now, what is the chance for a randomly chosen person in the population at large to be colorblind? Assume for the moment that there is a 50-50 chance that any individual is male or female. Then, intuitively, one expects the chance to be just the average of the male and female colorblindness probabilities. That intuition is right!

$$\begin{aligned} P(X \text{ is colorblind}) &= P(X \text{ is colorblind} | X \text{ is male}) * \\ &\quad 0.5 + \\ &\quad P(X \text{ is colorblind} | X \text{ is female}) * \\ &\quad 0.5 = 0.1 * 0.5 + \\ &\quad 0.01 * 0.5 = 0.055 \end{aligned}$$

The same rule applies in general: The chance for something to happen is the sum of the products of the chances for it to happen given all the possibilities, times the chances for each of those possibilities to occur. That's hard to understand in words, but in the notation of conditional probabilities it's almost trivial:

$$P(A) = P(A|B) * P(B) + P(A|C) * P(C) + P(A|D) * P(D) + \dots$$

This equation looks an awful lot like many you may have seen with fractions. If you like, you can consider the "given" symbol ("|") to be something like an inferior or "weak" division symbol. Multiplying an expression like $P(B|A)$, with A "weakly downstairs," by $P(A)$ gives $P(AB)$ —the A was "pulled upstairs" by the multiplication. $P(AB)$ is one way to write the chance of both A and B happening simultaneously.

TECHNICAL TIPS

Turnaround

But there is still more to this conditional probability notion. What if you know the chance for the conditional probabilities going one direction, and want to turn things around and answer a question the other way? For example, suppose you are told that "X is colorblind," and want to know the chance that X is female? This isn't so obvious!

Intuition tells you that X is probably not female, since the chance for X to be colorblind given that X is male is so much higher than it is when X is female. If your intuition is highly mathematical, it might even tell you that since the conditional probability going one way is ten-to-one in favor of males being colorblind, probably it will be similar going the other way. That's right!

Look once more at the general equation:

$$P(A) = P(A|B) \cdot P(B) + P(A|C) \cdot P(C) + P(A|D) \cdot P(D) \\ \dots = P(AB) + P(AC) + P(AD) \dots$$

The chance of both A and B simultaneously happening is the first term in the above equation, $P(A|B) \cdot P(B) = P(AB)$, read as "P of A and B." The chance of both A and C occurring is $P(A|C) \cdot P(C)$, the second term, and so on. But another way, just as good, to write the chance of both A and B being true is $P(B|A) \cdot P(A)$. We can put these two ways of saying the same thing on the two sides of an equation:

$P(A|B) \cdot P(B) = P(B|A) \cdot P(A)$
A little juggling then gives the easy-to-remember rule:

$P(B|A) = P(A|B) \cdot P(B) / P(A)$
We can interpret this equation in terms of the "weak division" meaning of the "given" ("|") sign. Dividing $P(AB)$ by $P(B)$ produces $P(A|B)$ —the B was "pulled downstairs" by the division.

Thus, the chance of X being male, given no information other than the fact that X is colorblind, is just $0.1 \cdot 0.5 / 0.055 = 0.9090 \dots = 10/11$. This follows simply by plugging into the latest equation. Similarly, the chance of X being female, given no information other than the fact that X is colorblind, is just $0.01 \cdot 0.5 / 0.055 = 0.09090 \dots = 1/11$. As intuition suggested, it's ten times likelier for X to be male than female, if X is colorblind.

Shuffle!

Another important area of probability involves counting—specifically, counting how many ways something can happen. For instance, in a previous column we talked about how many ways there are to arrange a deck of 52 cards.

The answer is easy. There are 52 choices for the first card, 51 more for the second (since, given the choice of the first card, there are fewer remaining choices for the second—conditional probability), 50 for the third card, etc. Multiplying up the possibilities, the answer is:

$$52 \cdot 51 \cdot 50 \cdot 49 \cdot \dots \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 52! \approx 8 \cdot 10^{67}$$

(That "!" is a notation for "factorial," by the way, in case you hadn't seen it before.)

But how many ways are there to pick, say, five cards from a deck of 52? Clearly, there are again 52 choices for the first, 51 for the second, etc., leading to $52 \cdot 51 \cdot 50 \cdot 49 \cdot 48$ choices. We can write that in factorial notation too:

$$52 \cdot 51 \cdot 50 \cdot 49 \cdot 48 = 52! / 47!$$

As you can see, writing out the terms, the excess numbers in the numerator of the fraction precisely cancel out the excess numbers in the denominator. This is so simple that it hardly needs any separate notation, given the "!" factorial symbol.

But a slightly more complicated question may arise. How many different groups of five cards can you draw from 52 if the order doesn't matter? That is, how many poker hands are there?


Our answer above is most of the way there—it gives us how many hands there are if the sequence of drawing the cards makes a difference. If we don't care about the sequence, then we have to divide by how many times each order occurs. Since every card is different, there are $5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 5!$ orders for drawing, and our answer is just:

$$52! / (47! \cdot 5!) = C_{52}^5$$

Here we've got a new notation. C_{52}^5 could be read as "the combinations of five things chosen from 52" or maybe more succinctly as "52 pick 5." This is exactly the same, numerically, as the number of ways to pick 47 things out of 52—obvious, if you think about the deck left in your hand as the "mirror image" of the cards dealt out. Sometimes combinations are written as a big parenthesis:

$$\binom{52}{5} = \binom{52}{47}$$

What to Remember

From all of this random collection of notations, the important thing to remember is the core idea—when faced with a complex, unmanageable situation, invent a convenient notation to make it tractable. Play with that notation—try to modify it so that it suggests what the right thing to do is, and prevents you from making a mistake. Follow the notation wherever it leads you—see if it implies something unforeseen about the problem you're working on, perhaps a better way of thinking about it that makes the solution obvious! 

Some Sample Notations


\ddot{a}

$\sqrt[3]{17}$

ζ

$e \approx \pi$

$\int_{-1}^{+1} f(x) dx$



$k \leq 1$


$3 \ll 3000 \pm 1$

$\sum_{i=1}^{\infty} \frac{1}{2^i}$

$\partial x / \partial y$

$\prod_{k=j}^m (1 - \frac{1}{k^2})$

$1 \neq 0$



\AA

$\binom{52}{5}$

Getting Started with MIDI Music

Part 1

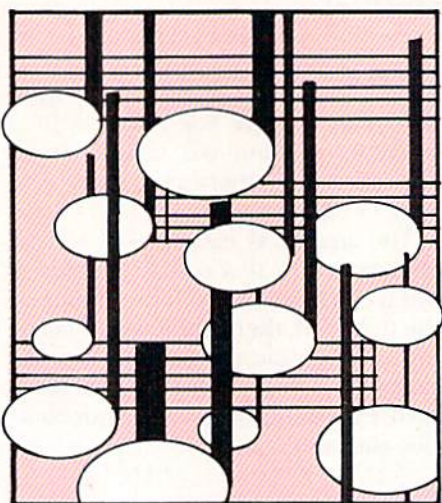
I know just how you feel — you've been reading about the new MIDI synthesizers and you can't wait to get started. But despite everything that's been written on the subject, it's still hard to figure out how to put together a basic MIDI system. In this article I'd like to discuss briefly the impact of this musical revolution and outline the kinds of hardware and software decisions you'll have to make to use MIDI technology with your computer. In a future issue, I'll be taking a closer look at a couple of specific Commodore-based MIDI systems.

First, you'll need a good idea of what the MIDI standard is and does. Let's start with a little background. Up until a few years ago, synthesizers were classified as analog devices because they used traditional electronic circuits to generate their sounds and communicate with each other. In these early days, there were almost as many ideas about how synthesizers should communicate as there were manufacturers!

As the personal computer revolution developed, there was a parallel development in music synthesizers that took advantage of the new computer technology. Besides spurring the development of digital based sound-synthesis hardware, computers revolutionized the storage, transmission, and manipulation of musical information.

The huge success of the personal computer permanently altered the electronic musical industry by creating an entirely new mass market for computer-based music systems. But to tap this market, something clearly had to be done about the continued proliferation of incompatible equipment. This problem was effectively solved by development and industry-wide acceptance of the Musical Instrument Digital Interface (MIDI).

MIDI is a hardware/software standard that defines both the physical



connections between synthesizers and the content of the messages that are transmitted between them. Almost every manufacturer of sound synthesizers now produces MIDI-compatible equipment. It's important to understand that the MIDI standard deals with the management of sound-synthesis equipment and not directly with the internal sound-producing circuitry. Thus, a large variety of devices like drum machines, keyboards, and guitar synthesizers, whether digital or analog, can all be MIDI-compatible.

However, there are two types of music hardware that are not MIDI-compatible. Older synthesizers (and any new synthesizers that don't adhere to the MIDI standard) are not MIDI-compatible. A great deal of this older equipment is now available at bargain prices. But, especially if you're just starting out in computer music, you shouldn't even consider buying non-MIDI equipment.

The second type of non-MIDI equipment that Commodore 64 users should be especially aware of are the piano-like keyboards that plug into the 64 and play through its Sound Interface Device (SID). Such devices may be tempting because they are relatively inexpensive and the synthesizer part (the SID chip) comes free with the computer. However, they are musically limited compared to even the most modest MIDI systems, and are generally not MIDI-compatible.

Once you have a MIDI-compatible synthesizer, the next step is to put together a system for controlling it. Computer control is fundamental to

the MIDI concept and an inexpensive general-purpose machine like the Commodore 64 is perfectly suited for this purpose. Note that the 64's SID chip is irrelevant for this application. However, the computer's internal sound capabilities can be useful in a way I'll mention later.

The computer that controls your MIDI equipment has two main functions: sending and receiving signals to and from one or more MIDI synthesizers. There are basically two kinds of signals in the "send" mode. First, you can instruct a synthesizer to select particular sounds (called "patches") from its repertoire. Second, you can send signals that the synthesizer understands as the pressing and releasing of keys on its keyboard (or the starting and stopping of its sounds by some other mechanism). In this role the computer controller acts like a sophisticated electronic version of a player piano.

MIDI works the other way around, too. If you select a sound patch on your synthesizer and play its keyboard, these events can be transmitted as MIDI information and stored in your computer, which can then play back the events just as you performed them. You might think of this function as roughly the equivalent of a tape recorder. But be careful! The computer records not the music itself, but only the information required to re-create it through a MIDI-compatible synthesizer.

These control functions may not seem all that sophisticated. However, the power of the MIDI concept lies in the ability to simultaneously transmit and receive signals to and from a large number and variety of instruments. For example, you can play on one device and transmit the same information to one or more other devices at the same time as it's being recorded by your computer, or you can record musical information from one synthesizer and play it back later through a completely different device. The possibilities are virtually endless.

The Basic MIDI System

Your basic MIDI system will include your computer, a MIDI interface, software, a MIDI-compatible

sound synthesizer, and a sound amplification system.

The MIDI interface consists of a cartridge that is designed specifically for your type of computer. (Some interfaces may plug into the user port, instead of the cartridge port.) The interface enables the exchange of information between your computer and your MIDI equipment. It includes at least two five-pin DIN plugs (as specified by the MIDI standard) — one MIDI-in and one MIDI-out.

Now you need the software, which may or may not be included with your hardware interface. MIDI software serves as the "music processor" for your system in much the same way that a word processor serves to aid the manipulation of words. As a minimum, MIDI software will link your computer to the rest of the system and provide the record/playback functions I discussed above by translating the signals passing through the hardware's interface. Additional functions allow you to create, manipulate, and edit musical information from the computer keyboard. For the most part, these creative functions of MIDI software are not standardized.

Next, there's the synthesizer itself. For a basic system, this should be a MIDI-compatible polyphonic keyboard. Use of such instruments is not restricted to MIDI systems and, in fact, many MIDI keyboards are basically intended to serve as stand-alone instruments for real-time performing. Finally, there's the sound system. This can be your home stereo or even the sound circuit in your TV or monitor. However, a good sound system is required to get the most out of even the most inexpensive synthesizer.

The Extras

Like computer systems themselves, MIDI systems have a way of growing! The most obvious accessories are more MIDI synthesizers — and remember that they don't have to be keyboards. You're free to explore the possibilities of drum synthesizers or other specialized sound generators. In such systems, your basic keyboard instrument will still serve as the primary music input device, while the others will function just as playback devices. (Your MIDI software will enable you to create music on one de-

Viewing a MIDI system simply as a fancy tape recorder vastly under-utilizes its creative potential.

vice and route it to a different one for playback.)

The MIDI standard supports up to 16 sound channels, but because of limitations in the speed at which MIDI information can be sent, there is some question about how many different instruments can effectively be supported simultaneously. The timing of MIDI signals is critical to the success of the system. MIDI software typically provides an internal computer-generated timing signal, but it should also be possible to connect an external clock through the MIDI interface. The clock, whether internal or external, functions like a fancy metronome, but with a significant difference: The MIDI standard expects each quarter note (typically one metronome beat) to be divided into 24 parts. This, by the way, is where a computer's internal sound generating capability comes in — it can easily produce a metronome tick in sync with the internal clock.

Why would you need an external clock if your computer can be programmed to provide a timing signal? A separate clock is more flexible; it will have its own speed control and it may not be restricted to producing one tick for every quarter note. Also, the timing signals from an external clock can be useful if you are trying to operate non-MIDI equipment in synchronization with MIDI equipment. Clocks are often included in rhythm synthesizers, and you may want to use this clock to let the "rhythm section" of your MIDI system be responsible for keeping everything synchronized.

When you have more than one synthesizer in your system, and if any of them don't have a MIDI-thru connector, you will need another piece of hardware called a MIDI-thru box. This device provides you with multiple MIDI-out connectors to link sev-

eral MIDI devices together just like you link printers and disk drives on your computer. There are technical reasons, having to do with the way MIDI signals are sent, that make a MIDI-thru box a good idea for multiple-synthesizer systems even if all your equipment includes MIDI-thru connectors.

The Details

Now let's take a close look at the equipment in your MIDI system. Since a MIDI hardware interface costs almost as much as your Commodore 64 did, it's important to understand your needs and options. Some interfaces include software, either in a cartridge or on disk. (You shouldn't try to build a MIDI system around a cassette-based information storage system.) With some hardware, you may be restricted to software provided by the manufacturer, but other models allow you to replace the manufacturer's software or buy the hardware and software from two different sources.

How can you tell what the software options are for a particular MIDI interface? If a program automatically loads when the system is turned on, then you have to determine if that software can be replaced once the program is running. If your computer stays in its "ready" state when it's turned on with the MIDI interface in place, it's waiting for you to load software from disk. I prefer the flexibility of loading separate programs because it's certain that better programs will be written in the future as the MIDI concept develops.

There are some other things to look for in an interface. It should have a clock-in connector in case you want to add an external clock. It may have a footswitch connector that you can use to start and stop certain record or playback functions when your hands are otherwise occupied.

Because of the wide variety of MIDI interfaces and synthesizers, there's no such thing as "universal" MIDI software. You should, however, look for a program that will communicate with a variety of MIDI equipment through your interface.

The basic concepts of MIDI software are derived from the experiences of analog multitrack recording. The software should let you record,

overdub, synchronize, rearrange, and play back several tracks of music, all without even thinking about anything so primitive as a tape recorder. The data storage and manipulation capability of even the most modest computer gives a flexibility for rearranging and combining musical sequences that is beyond the most sophisticated analog system. Typical MIDI programs for the 64 allow you to store and manipulate several thousand notes (or, more precisely, MIDI events, most of which will result in the sounding of notes). This musical information may be saved as a sequential file and recalled at any time.

Composing and Editing MIDI Music

The multitrack recording functions of MIDI software tend to favor playing music in real time, and it's clear that you can obtain very impressive results much more easily than with an analog system. However, whether or not you're a real-time keyboard wizard, the step-time capabilities of your MIDI system should make it possible for you to compose and record music that one person (or several) could never play on a keyboard in real time. (When you use step time, you enter each note and its parameters individually, through the computer.) As you can see, viewing a MIDI system simply as a fancy tape recorder for reproducing music played in real time vastly under-utilizes its creative potential.

Musical information created on a MIDI system is stored in a data file as a series of timed events. Your software is responsible for associating every MIDI event with one of the 24 subdivisions of a quarter note produced by the clock system. Using the MIDI at this level might be called microcomposing, distinguishing it from real-time playing.

The way your software accesses MIDI files for music creation and editing will determine its musical orientation. For example, some software has what is called "punch-in/punch-out" capability, a term borrowed directly from analog recording. In such systems, you can listen to a recorded track and replace a part you don't like by "punching in" to the record mode, re-recording the part in real time, and "punching out" when you're done. An

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example of software that operates this way is Passport's *MIDI/Plus 8* program for their Commodore 64 MIDI interface.

It could be argued that punch-in/punch-out editing is ideal for musicians who aren't interested in computers or direct access to the data in their MIDI music files. However, this real-time approach works only if you have reasonable hopes of playing an offending part correctly in subsequent tries!

An alternative means of editing is to manipulate the musical information on disk using the computer. The components of each individual event can then be edited in step time instead of real time. For example, you could change the pitch, volume, or duration of one or more notes, or add new notes to the sequence. This file-oriented approach opens up editing and composing possibilities that have no counterpart in analog recording, and is available in, for example, the *Keyboard Controlled Sequencer* from Dr. T.'s Software. In this case, you can also achieve the equivalent of a punch-in/punch-out function by recording the new material as a separate sequence, deleting the old material from the original sequence, and inserting the new material in its place.

Ultimately, a file-oriented "microcomposing" capability allows you to create music from scratch directly from the computer keyboard, without using a synthesizer keyboard at all. This may be a very inefficient way to make conventional music, but it's a

valuable and creative way of extending your technical capabilities.

It's worth noting that displaying MIDI events using conventional musical notation is not necessarily the best way to work with the contents of MIDI music files. Although some concepts, like pitch, may be accurately portrayed in this way, other concepts, like note duration, have many quantifiable parameters in the MIDI context that are poorly served by conventional notation. This is an area of software design that has not yet been resolved.

There's one important kind of MIDI file editing that's very useful, no matter what your keyboard skill level. Many MIDI programs contain a so-called auto-correcting or quantizing function that allows you to correct small rhythmic inaccuracies in a musical sequence you've recorded. This takes just a few seconds, and can be done at a variety of time resolutions.

Quantizing clearly demonstrates the value of editing MIDI files in step time. Suppose you play a passage consisting of quarter notes and a few sixteenth notes. If you wish to quantize this passage with a real-time punch-in/punch-out editor, you must do so at sixteenth-note resolution. However, because you may be unable to play the quarter notes completely accurately, they may very well be affected by the quantizing necessary to correct the timing of the sixteenth notes. On the other hand, a true step-time editor lets you quantize at the resolution of a quarter note, ensuring that all these notes are of the proper length. Then you can access the MIDI file and manually correct the timing of the sixteenth notes.

Buying a MIDI System

When you get ready to put together your first MIDI system, the software will present the toughest decisions. Assuming you're happy with the way a program handles editing, how can you tell if it will otherwise suit your needs? Here are some specific suggestions:

1. Bear in mind that the written specifications of music programs tend to make them look about the same on paper; actual performance varies considerably. For this reason, try to get some hands-on time using a program

with a complete MIDI system.

2. Study the manual before you buy software. A short, breezy manual may initially be more tempting than a larger one with smaller print, but the instructions that look so friendly at first may prove inadequate as your skills progress.

3. Don't place too much faith in prepared demonstrations. The strong and weak points of music software are hardly ever made clear in this way unless you already know what to look for.

4. Insist on a program that is self-contained on a single disk. There seems to be no technical justification for the practice of dividing music processing functions into several programs that must be purchased separately. There are several well written and reasonably priced MIDI (and Commodore 64-SID) programs that combine all required functions on a single program disk. I might make an exception for a score-printing program, as this is a highly specialized function that you will not normally need in the course of developing MIDI music files.

5. Don't be overly impressed by flashy graphics. Although professional programmers may sneer at graphically straightforward menu-driven software, it's worth keeping in mind that good music programs are often written by an individual who is a musician first and a programmer second. Such programs may be visually unexciting but very well thought out and carefully implemented.

MIDI standardization has eased many hardware compatibility problems so that your system can include a variety of devices from different manufacturers. However, within the available mix of MIDI hardware and software, there are still potential system compatibility problems. Your software and hardware manuals will help, but they can't possibly cover every situation you will encounter. Unless you have a lot of confidence in your own computer and musical skills, you should insist that all components of any system you consider be assembled and demonstrated to your satisfaction.

The capabilities of synthesizers vary greatly, and technology is changing so rapidly that price is not always

A large variety of devices, like drum machines, keyboards and guitar synthesizers can all be MIDI compatible.

a reliable guide to hardware — a situation familiar to personal computer users! There are two important questions you will need to ask about any keyboard synthesizer you're thinking of buying. The first is, "Will it operate in a mono mode?" If so, each of its channels may be programmed with a different sound, so you can have several instrumental sounds coming from the same device. This feature is especially desirable for a one-synthesizer system.

The second question is "Does it have a velocity-sensing keyboard?" If so, you can generate volume changes as you play, just as on a real piano. Velocity-sensing keyboards are generally more expensive and the MIDI information they send takes up more computer memory. Some keyboards will respond to velocity information when they're receiving MIDI information, but will not generate or send it.

Buying a MIDI system is still not a painless task. The traditional retailers of electronic music hardware are used to dealing with a relatively small market of studio and performing musicians. They are not yet used to computers, computer users, or the kinds of products that have the mass-market potential of MIDI hardware and software. I have been told by some retailers that they have no plans to stock MIDI software because it's too hard to demonstrate and can't be sold as profitably as hardware. This is a situation that is bound to change, but it's not very helpful right now!

The day of totally integrated MIDI systems is not yet here, so there is no current alternative to understanding the components of a modular system. My prediction is that MIDI synthesizers will continue to be purchased separately from the interfaces and

software necessary to drive them. Finally, the wide distribution of general-purpose personal computers guarantees their dominant role in MIDI systems for the foreseeable future.

How much should a basic MIDI system cost? It's very hard to be precise because this equipment is now in the midst of the same capability-versus-price explosion that has caused the price of computing power to plummet. However, for an interface, software, and synthesizer, you can expect to pay about as much as you already have invested in your computer, disk drive, monitor, and printer.

Commodore Owners Get All the Breaks

The tremendous success of the Commodore 64 and its SID chip has attracted a lot of talented musicians and programmers to writing music software. As a result, 64 owners have access to many non-MIDI programs for music composition, the best of which give full-function music processing capability for the resources of the three-voice SID chip. Because these programs are inexpensive (around \$30-\$40), they are certainly a reasonable first step for anyone considering a MIDI system, even though they are not MIDI compatible.

Some Commodore 64 music programs are now being developed that will produce music files compatible with both the SID chip and an external MIDI synthesizer. This means that you can get started on your 64 with no extra hardware, and progress to a MIDI system without buying new software later.

Conclusions

I hope I haven't made getting started with MIDI seem too formidable a task. It's not really much different from putting together your first computer system. The process itself is exciting and a lot of fun. I'll be sharing my own experiences with assembling a MIDI system in a future article. Perhaps that will help if you're still a little hesitant about entering this new world on your own. As for the payoff, well, if you've ever gotten hooked on what you can do with your computer and a word processor, just wait until you see what a MIDI system will do for music!

C

BASIC 7.0

Tokens

for the Commodore 128

The new Commodore 128 contains both 8502 and Z80A microprocessors, although the Z80A processor is normally used only for CP/M. The 8502 is a close cousin to the 6502 and 6510 processors used in previous Commodore systems, and supports the same instruction set. It still uses a 16-bit address, limiting its direct addressing capabilities to a 64K range. But the 128 extends this range, because the processor has access to two memory "banks" that are each 64K in size.

The built-in machine-language monitor available in 128 mode allows you to address each of the 64K banks by using a five-digit hex address for all functions. The high-order hex digit automatically selects the appropriate memory bank, so you can think of it as one contiguous memory space. This lets you forget about the bank switching most of the time, making it easy to deal with the larger address space.

When you run BASIC in the 128 mode, the 128K of RAM memory is divided into 64K of program space and 64K of data space. As a result, the BASIC FRE command now has a parameter to select program or data space so you can check how much of each is available. The 64K of program space is also used by BASIC and the graphics functions as working storage, so you actually have less than 64K available.

When BASIC programs are stored in memory in 128 mode, they are still tokenized and stored in the same format that has been used in all previous Commodore systems. Each program line is stored as a two-byte link, a two-byte program line number, the tokenized program line, and a single byte of zero that acts as an end-of-line flag. The two-byte link and program line number are both stored in normal 6502 address format, with the low-order byte followed by the high-order

This BASIC translator will read a file created by BASIC 4.0 and create a new file that can be used by BASIC 7.0 on the Commodore 128.

byte.

Program lines are stored sequentially in memory with the link containing the starting address of the next

program line. The links are used only for certain functions, however, such as searching for a specific program line when doing a GOTO or GOSUB command. When program lines are executed sequentially, the links are simply ignored. In 128 mode on the C128, the two-byte link is the main reason BASIC programs cannot normally exceed 64K in length. A larger link would be needed to allow bigger programs, but then the programs would no longer be compatible with older Commodore systems.

Since each program line number is converted to a two-byte hex number and stored in 6502 address format, as mentioned earlier, this condenses most line numbers, which conserves space internally and keeps all line numbers in a consistent format that is

Table I
Commodore 128
BASIC 7.0 Single-Byte Tokens

Decimal	Hex	BASIC	Decimal	Hex	BASIC
128	80	END	160	A0	CLOSE
129	81	FOR	161	A1	GET
130	82	NEXT	162	A2	NEW
131	83	DATA	163	A3	TAB(
132	84	INPUT#	164	A4	TO
133	85	INPUT	165	A5	FN
134	86	DIM	166	A6	SPC(
135	87	READ	167	A7	THEN
136	88	LET	168	A8	NOT
137	89	GOTO	169	A9	STEP
138	8A	RUN	170	AA	+
139	8B	IF	171	AB	-
140	8C	RESTORE	172	AC	*
141	8D	GOSUB	173	AD	/
142	8E	RETURN	174	AE	(up arrow)
143	8F	REM	175	AF	AND
144	90	STOP	176	B0	OR
145	91	ON	177	B1)
146	92	WAIT	178	B2	=
147	93	LOAD	179	B3	<
148	94	SAVE	180	B4	SGN
149	95	VERIFY	181	B5	INT
150	96	DEF	182	B6	ABS
151	97	POKE	183	B7	USR
152	98	PRINT#	184	B8	FRE
153	99	PRINT	185	B9	POS
154	9A	CONT	186	BA	SQR
155	9B	LIST	187	BB	RND
156	9C	CLR	188	BC	LOG
157	9D	CMD	189	BD	EXP
158	9E	SYS	190	BE	COS
159	9F	OPEN	191	BF	SIN

easy for BASIC to process. Since this is a two-byte value, it would normally limit program line numbers to 65535 (64K). However, BASIC has an internal limit that only allows program line numbers up to 63999.

When a program line is stored, each BASIC keyword is converted to a special one- or two-byte value called a token. All other variables, text strings, etc., are stored exactly as they are entered, with one character per byte. Tables I through III show the corresponding token values for each BASIC keyword in BASIC 7.0. Note that the arithmetic and comparison operators are considered keywords by BASIC and are tokenized instead of being stored with their normal character code.

The token values shown in Table I from 120 to 202 decimal (\$80 to \$CA

hex) are identical for all Commodore systems. The Commodore 64 and some other Commodore systems also include the 203 decimal (\$CB hex) token for the GO command. This allows loading of most BASIC programs from other Commodore systems without too many problems, but more about that later. The additional tokens shown in Table I are valid only for BASIC 7.0 in the 128 mode on the Commodore 128.

The two-byte tokens shown in Table II each start with a value of 206 decimal (\$CE hex) followed by the value shown in the table. Likewise, the tokens shown in Table III each start with a value of 254 decimal (\$FE hex) followed by the value shown in that table.

The entries marked with asterisks in Table III deserve special mention.

They represent special BASIC commands that are reserved for future RAM disk functions that are not yet implemented in the Commodore 128. For now, these five commands are reserved keywords and cannot be used as part of variable names. They are tokenized by BASIC, but the corresponding command is not implemented. If you get an "unimplemented command" (error #40) or an unexplainable syntax error, look for one of these reserved keywords somewhere in the line in question.

Anyone who has used BASIC 4.0 on the older PET and CBM systems (or with something like the C64 LINK on the Commodore 64) is in for a surprise. All of the disk commands from BASIC 4.0 are now included in BASIC 7.0 on the Commodore 128, but there's a catch. The tokens used for each of these commands are different in the two versions of BASIC. Table IV compares the tokens used for the various disk commands in both versions of BASIC. Note also that some of the tokens in BASIC 7.0 are now two-byte tokens, in addition to having different values.

These differences between token values pose a hidden problem for programs using the disk commands shown in Table IV. Identical programs entered from the keyboard on both versions of BASIC will run correctly on the machine they were entered on. However, you cannot take a program that was entered with BASIC 4.0, load it on a machine that uses BASIC 7.0,

**Table I (continued)
Commodore 128
BASIC 7.0 Single-Byte Tokens**

Decimal	Hex	BASIC	Decimal	Hex	BASIC
192	C0	TAN	224	E0	CHAR
193	C1	ATN	225	E1	BOX
194	C2	PEEK	226	E2	CIRCLE
195	C3	LEN	227	E3	GSHAPE
196	C4	STR\$	228	E4	SSHAPE
197	C5	VAL	229	E5	DRAW
198	C6	ASC	230	E6	LOCATE
199	C7	CHR\$	231	E7	COLOR
200	C8	LEFT\$	232	E8	SCNCLR
201	C9	RIGHT\$	233	E9	SCALE
202	CA	MID\$	234	EA	HELP
203	CB	GO	235	EB	DO
204	CC	RGR	236	EC	LOOP
205	CD	RCLR	237	ED	EXIT
206	CE	(see Table II)	238	EE	DIRECTORY
207	CF	JOY	239	EF	DSAVE
208	D0	RDOT	240	F0	DLOAD
209	D1	DEC	241	F1	HEADER
210	D2	HEX\$	242	F2	SCRATCH
211	D3	ERR\$	243	F3	COLLECT
212	D4	INSTR	244	F4	COPY
213	D5	ELSE	245	F5	RENAME
214	D6	RESUME	246	F6	BACKUP
215	D7	TRAP	247	F7	DELETE
216	D8	TRON	248	F8	RENUMBER
217	D9	TROFF	249	F9	KEY
218	DA	SOUND	250	FA	MONITOR
219	DB	VOL	251	FB	USING
220	DC	AUTO	252	FC	UNTIL
221	DD	PUDEF	253	FD	WHILE
222	DE	GRAPHIC	254	FE	(see Table III)
223	DF	PAINT			

**Table II
Commodore 128
Two-Byte Tokens Starting with
206 Decimal (\$CE hex)**

The following BASIC tokens are each two bytes long with the first byte being 206 decimal (\$CE hex) and the second byte as shown in the table:

Decimal	Hex	BASIC
2	02	POT
3	03	BUMP
4	04	PEN
5	05	RSPPOS
6	06	RSPRITE
7	07	RSPCOLOR
8	08	XOR
9	09	RWINDOW
10	0A	POINTER

and expect it to run correctly if it uses these commands. But because the tokens still represent valid commands under BASIC 7.0, unexpected things are going to happen!

To help alleviate potential problems caused by incompatible tokens, I've written a short utility program that's

included here. This BASIC translator will read a program file on disk created by BASIC 4.0 and create a new file on disk that can be used by BASIC 7.0 on the Commodore 128. It translates all the BASIC 4.0 disk command tokens to the appropriate BASIC 7.0 tokens and changes the default load address in the file to the default Commodore 128 load address. Type it into your 128 and save it.

After you save and run the translator utility and know it's working properly, remove your disk (leaving the translator in memory) and insert the disk containing the appropriate BASIC 4.0 program to be converted. When prompted for the INPUT FILENAME, enter the full name of the program to be converted exactly as it appears in the disk directory. When you are prompted for the OUTPUT FILENAME, enter the name you want for the new program file to be created.

Make sure that the two file names are different and the output file name doesn't match anything that is already on the disk. If any problems are encountered, an error message will be displayed and the program will abort. When the appropriate files are properly opened, the translator program will proceed to read the input file, convert the tokens, and write the updated lines with correct link addresses in the new program file.

The current program line number will be displayed as the program progresses, to give you some idea of where it is. When the translator is finished, the new program file is ready to be loaded into the Commodore 128 in 128 mode and will list correctly.

Additional changes may be required, however, to make the program function properly. This program will not look for problem areas with the various BASIC additions in BASIC 7.0 and will not fix certain screen-handling or graphics commands used in other Commodore systems. It only corrects differences between the disk command tokens so you can at least properly list the program. You should stand a fair chance of properly running the program, but additional fixes may be required.

Watch out for the reserved keywords, new special variables, and added parameters to older commands when transferring programs to BASIC 7.0 in 128 mode on the Commodore 128. Be especially careful when editing existing program lines, since lines entered on another system may be tokenized differently when edited on the Commodore 128. There are several potential problem areas I'm still investigating, but more about that in a future article.

Editor's Note: The Token Translator program will also convert BASIC 4.0 tokens on the Plus/4 computer. **G**

Table III
Commodore 128
Two-Byte Tokens Starting With
254 Decimal (\$FE hex)

The following BASIC tokens are each two bytes long with the first byte being 254 decimal (\$FE hex) and the second byte as shown in the table:

Decimal	Hex	BASIC
2	02	BANK
3	03	FILTER
4	04	PLAY
5	05	TEMPO
6	06	MOVSPR
7	07	SPRITE
8	08	SPRCOLOR
9	09	RREG
10	0A	ENVELOPE
11	0B	SLEEP
12	0C	CATALOG
13	0D	DOPEN
14	0E	APPEND
15	0F	DCLOSE
16	10	BSAVE
17	11	BLOAD
18	12	RECORD
19	13	CONCAT
20	14	DVERIFY
21	15	DCLEAR
22	16	SPRSV
23	17	COLLISION
24	18	BEGIN
25	19	BEND
26	1A	WINDOW
27	1B	BOOT
28	1C	WIDTH
29	1D	SPRDEF
*30	1E	QUIT (reserved)
*31	1F	STASH (reserved)
*33	21	FETCH (reserved)
*35	23	SWAP (reserved)
*36	24	OFF (reserved)
37	25	FAST
38	26	SLOW

The five starred commands are actually reserved words that are tokenized by BASIC but represent currently unimplemented commands.

Table IV
Comparison of BASIC 4.0 Disk Commands
with Equivalent Commodore 128 Tokens

BASIC 4.0			BASIC 7.0	
BASIC	Decimal	Hex	Decimal	Hex
CONCAT	204	CC	254, 19	FE 13
DOPEN	205	CD	254, 13	FE 0D
DCLOSE	206	CE	254, 15	FE 0F
RECORD	207	CF	254, 18	FE 12
HEADER	208	D0	241	F1
COLLECT	209	D1	243	F3
BACKUP	210	D2	246	F6
COPY	211	D3	244	F4
APPEND	212	D4	254, 14	FE 0E
DSAVE	213	D5	239	EF
DLOAD	214	D6	240	F0
CATALOG	215	D7	254, 12	FE 0C
RENAME	216	D8	245	F5
SCRATCH	217	D9	242	F2
DIRECTORY	218	DA	238	EE

128 USERS ONLY

Before typing this program, read "How to Enter Programs."

Token Translator

```

180 PRINT"[CLEAR]";SPC(12);
"BASIC TRANSLATOR[DOWN2]"
190 PRINT"THIS PROGRAM CONVERTS BASIC
TOKENS FOR"
200 PRINT"BASIC 4.0 DISK COMMANDS TO
THE CORRECT"
210 PRINT"VALUES FOR THE C-128 BASIC
7.0[DOWN2]"
220 DIM TS(15): TS(1)=CHR$(254)+CHR$(
19): TS(2)=CHR$(254)+CHR$(13)
230 TS(3)=CHR$(254)+CHR$(15)
: TS(4)=CHR$(254)+CHR$(18)
240 TS(5)=CHR$(241): TS(6)=CHR$(243)
: TS(7)=CHR$(246): TS(8)=CHR$(244)
250 TS(9)=CHR$(254)+CHR$(14)
: TS(10)=CHR$(239): TS(11)=CHR$(240)
260 TS(12)=CHR$(254)+CHR$(12)
: TS(13)=CHR$(245): TS(14)=CHR$(242)
270 TS(15)=CHR$(238): CLOSE 15
: OPEN 15,8,15
280 PRINT"[DOWN]INPUT FILENAME"
: INPUT F1$
290 OPEN 5,8,5,"0:"&F1$&".P,R"
: GOSUB 500
300 PRINT"[DOWN]OUTPUT FILENAME"
: INPUT F2$
310 OPEN 6,8,6,"0:"&F2$&".P,W"
: GOSUB 500
320 PRINT"[DOWN]SCANNING PROGRAM FOR
TOKENS TO CONVERT,"
330 PRINT"NOW AT LINE NUMBER.....
[DOWN]"
340 GOSUB 470: PRINT#6,CHR$(1);
CHR$(28);: LA=7169: GOTO 450
350 GOSUB 470: LN=V1+(256*V): PRINT LN;
"[SPACE7]": PRINT"[UP]";: L$=CHR$(V1)
360 L$=L$+CHR$(V)
370 GOSUB 480: IF V=0 THEN 430
380 IF V=34 THEN 410
390 IF (V<204) OR (V>218) THEN 360
400 L$=L$+TS(V-203): GOTO 370
410 L$=L$+CHR$(V): GOSUB 480
: IF V=34 THEN 360
420 IF V>0 THEN 410
430 LA=LA+LEN(L$)+3: A1=INT(LA/256)
: A2=LA-(A1*256)
440 PRINT#6,CHR$(A2);CHR$(A1);L$;
CHR$(0);
450 L$="": GOSUB 470: IF V+V1>0 THEN 350
460 PRINT#6,CHR$(0);CHR$(0);
: PRINT TAB(10);"< DONE >"
: GOTO 520
470 GOSUB 480: V1=V
480 GET#5,C$: GOSUB 500: V=0
: IF C$<>" THEN V=ASC(C$)
490 RETURN
500 INPUT#15,EN,EMS,ET,ES
: IF EN=0 THEN RETURN
510 PRINT"[DOWN]DISK ERROR[DOWN]"
: PRINT EN;EMS;ET;ES
520 CLOSE 5: CLOSE 6: CLOSE 15

```

END

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Copycalc: An electronic spreadsheet. Turns your Commodore into a visible balance sheet; includes screen editor. "Excellent program for budgeting, estimating, or any math-oriented use... well worth the money. Highly recommended." —Midnite Software Gazette.

Also included: **ReportGen, ReportMerge** (these interface W/P with Database to create form letters, statements, invoices, mailing labels, other reports.); **Baseball Statistician** (compiles batting statistics for a baseball league); several W/P utilities, including **Index** (indexes W/P's text files); several Database utilities, including **DBmerge** (facilitates multi-file database applications.), and **DBstat** (analyzes D/B files); a programming utility, **ASCII**, which converts text files (program listings) into program files; also **Checkbook, Inventory, Paper Route, Loan Analysis, Breakeven Analysis, Depreciation, Labeler, File Copier**; more.

Versions of the package are available for every Commodore computer having a minimum of 10k RAM (including the C-128 in 128 mode). All programs will support tape, disk, and printer. Price includes documentation; Calif. residents add 6%. Add \$3 for credit card, COD, 8050 disk, or cassette orders (cassette not available for Plus4™ and 16™). No personal checks from outside USA. This ad is the catalog; send \$1 (deductible from order) for a sampling of program output.

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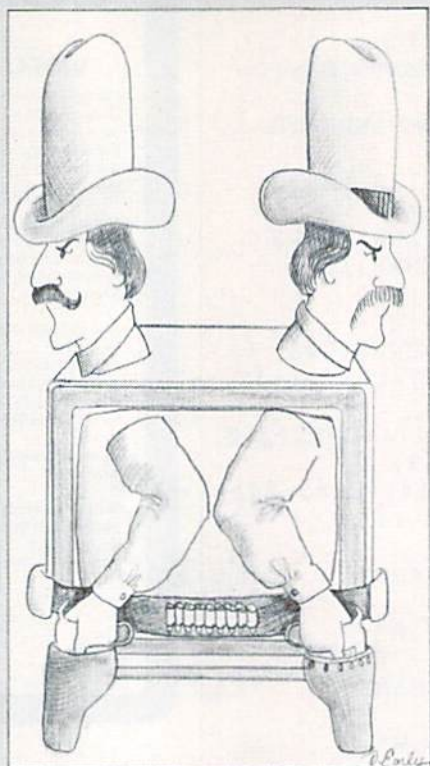
Dual Screen for the Commodore 128 With 1902 Monitor

Dual disk drives are a nice luxury. And having a second computer is nice, too. But how many of you have considered the benefit of having a second screen, like the one available on Commodore's 1902 monitor? The 1902 monitor for the Commodore 128 has the ability to run an 80-column text screen, and, with a flip of the switch, go to the 40-column screen with its high-resolution capabilities.

I have a Commodore 1902 monitor, but I keep my 1702 monitor plugged in and sitting right next to it. This way I can see both screens at once, rather than having to flip the switch on the 1902. All the techniques I am about to explain, however, can be used with the 1902 alone.

The most obvious benefit of having two screens is that you can run text on an 80-column screen while showing charts and high-resolution graphics on a 40-column screen. But there are others, as well. For instance, if a portion of a Commodore 128 program you're working on in 40-column has a GOSUB to somewhere, you don't have to lose your place in the routine you're working on just to see what the GOSUB does. Instead, press the ESC (escape) key and the X key. Now your cursor is blinking on the 80-column screen of the 1902 monitor. You list the subroutine, then ESC X back to the 40-column screen, where your original routine remains unaffected. This way you can see another portion of the program without disturbing the part you're working on.

Another trick is to list a routine on the 80-column screen. Go back to the 40-column screen, list it again and make changes and tests. This way you still have a ready reference on the 80-column screen to what the routine originally was. If something isn't working right as you make changes on the 40-column screen, you can always



*Take advantage
of the Commodore
128's ability to run
both a 40- and 80-
column screen at
the same time.*

switch to the 80-column screen and hit RETURNS on the old lines, bringing them back to life.

If you're programming a routine in C128 mode, and you want to test it in C64 mode, save it to disk, list it to the 80-column screen, G064 and reload it. No need to make a hard copy print-out; while you are running the program in 40-column, the listing remains on the 80-column screen for ready reference.

Screen merging is also a snap. On the 80-column screen, you list the program you want to merge. (You can get more on the 80-column screen because you have twice the room and less wrap-around.) Then use the 40-column screen to load the other program. Use ESC X to get to the 80-

column screen, change line numbers if you wish, and hit RETURN on all the lines. Mass merging.

If you are designing a little routine—specifically, one that fits entirely on the screen when listed—and you want to see a routine out of some other program, you can list the routine you're working on to the 80-column screen, then switch to the 40-column and load the second program (you lose the first program from memory, but it is still on the 80-column screen). Now you can list the second program on the 40-column screen and look at it. If you want to use some lines from the second program, you type NEW. Then you can change the line numbers if you wish and hit RETURN on them. Then switch back to the 80-column and, by hitting RETURNS on the first program, put it back into memory.

You can also juggle two programs at once. I was cleaning up one of my test disks and had two programs I wanted to keep. I loaded and listed the short program to the 80-column screen, switched to the 40-column screen and loaded the long one (but didn't have to LIST it). Then I HEADERed the disk, saved the big program, typed NEW, switched to the 80-column screen, hit RETURNS on the short program and saved it.

Tracing

For the utmost in program tracing, you can see what your program is doing behind the scenes without bothering your main screen. For example, you might want to watch your math taking place, or have your variables print out. Simply place a GRAPHIC 5,0 in the program. This tells the cursor to switch over to the 80-column 1902 monitor.

Now you can print anything in the program to the screen, and in any color, by adding PRINT statements such as :PRINT "A equals "A:. When it is time for your program to do something on its own screen, put in GRAPHIC 0,0. This swaps the cursor back to the 40-column screen. Each screen remembers where the cursor was and what color it was.

While the tracing is being performed you can pause the program to,

Continued on pg. 126



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DISCOVERY LEARNING ON THE 64

Computer "Microworlds"
Help Preschool Children
Learn Important Cognitive Skills

by Daniel D. Shade, Ph.D.

It takes time before the full potential of any new technology is realized. Early civilization, for example, saw the wheel as a tool for grinding flour and hauling rocks. Only centuries later was the technology of the wheel used to create automobiles.

More recently, when television was first introduced, its first programs were nothing more than radio shows you could see. Radio personalities like Milton Berle and Jack Benny stood in front of a camera to do the same old thing they'd been doing on radio. Only later were television's unique capabilities exploited fully to bring us programs that are visually and aurally exciting.

When it comes to computers as



educational tools, some educators and software manufacturers are still in the Milton Berle/Jack Benny stage. Many educational software products are no more than electronic versions of the same old flash cards and workbooks; electronic page turning at best. I would like to suggest that these are primitive uses for a very sophisticated piece of technology that is uniquely suited for special applications that no other previous technology could provide, and which we have barely begun to investigate.

Two educators who have been the most vocal about the uniqueness of the microcomputer as a learning tool include Seymour Papert of the Massachusetts Institute of Technology and his colleague, Robert Lawler. Together they have done much to promote the important "discovery learning" experience the computer provides for children. They have done so most notably through the use of the LOGO programming language, which was designed by Papert and his colleagues at MIT specifically as a learning tool for children.

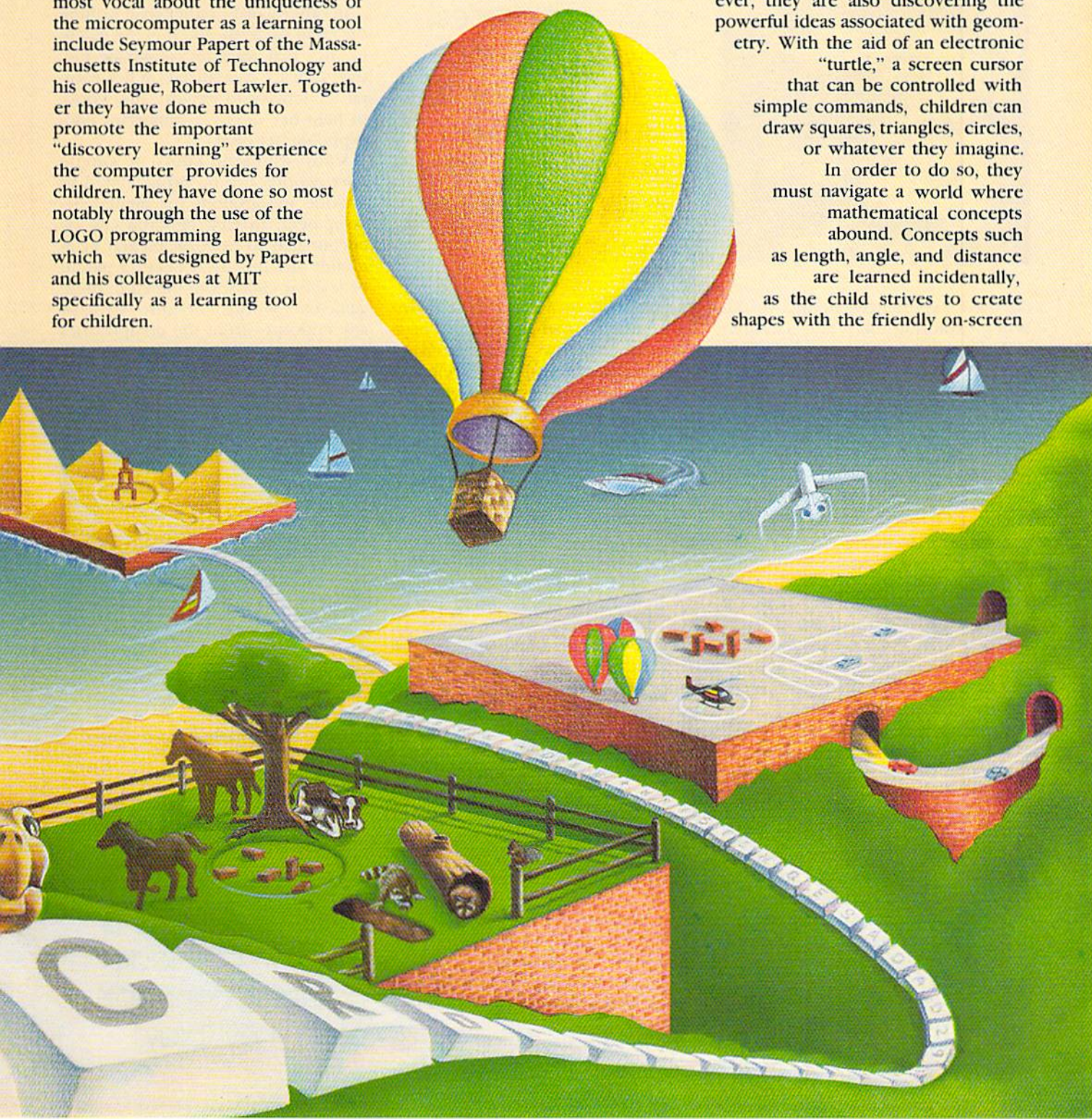
What is Discovery Learning?

Discovery learning is a distinct process that occurs whenever children are free to follow their own agenda; whenever the child's natural interests of the moment determine the focus of his or her attention. The learning that takes place in this way is incidental to the play, but, nevertheless, the fact is that children engaged in an activity for mere pleasure also learn a wealth

of concepts. Block play is a good example of this. Children love to make roads, build bridges, and stack towers. Yet, while they are engaged in these entertaining activities, they are also learning about shape, size, weight, and balance, while at the same time developing gross-motor skills and an aesthetic sense.

The same kind of discovery process occurs when a child uses LOGO. Although ostensibly a programming language, LOGO also constitutes a "microworld" where children can "play." While they are playing, however, they are also discovering the powerful ideas associated with geometry.

With the aid of an electronic "turtle," a screen cursor that can be controlled with simple commands, children can draw squares, triangles, circles, or whatever they imagine. In order to do so, they must navigate a world where mathematical concepts abound. Concepts such as length, angle, and distance are learned incidentally, as the child strives to create shapes with the friendly on-screen



turtle.

Discovery learning is not a new concept. Jean Piaget, the noted Swiss psychologist, has long told us that young children develop intellectually in a unique way, and has often used the term "constructivism" to describe this development. His theory is that children construct their own cognitive intelligence or knowledge, based



on their experiences of the world. While exploring the world, children make hypotheses (best guesses) about how things work and how events proceed. Further exploration leads to the confirmation or rejection of these best guesses.

From Piaget's perspective, intellectual development can be seen more or less as the process of collecting confirmed hypotheses. Think of each guess a child makes about his or her world as if it were a brick. As the child collects bricks (makes and confirms hypotheses) faulty bricks (incorrect guesses) are discarded, good bricks (correct guesses) are retained, and the wall of intelligence or knowledge is slowly formed. Sometimes the discovery of a particular concept may cause major restructuring of the wall; Piaget called this accommodation. At other times, it is only necessary to rearrange parts of the wall; Piaget called this assimilation.

Through this process, the child builds a cognitive understanding of the world around him or her, layer upon layer, brick by brick. Although this theory does not explain how children learn the names of the presidents of the United States, it does account for how they come to understand complex concepts such as causality, number, volume, mass, weight, and the like.

Creating Computer Microworlds

Microworlds like LOGO, in the broadest sense, allow children to enter a world of complex concepts at the simplest level possible. Once inside the microworld, the child is free to discover the concepts implanted

Discovery learning is a distinct process that occurs when children are free to pursue their own agenda—when their natural interests are engaged.

there in their own way, at their own pace. This broad definition of a microworld allows us to envision endless possibilities for developing concept-rich worlds where children play for the fun of it. The learning that takes place may be incidental, but it is not inconsequential. It is, in fact, the most significant kind of learning a child can be exposed to.

Even more exciting has been the extension of the "microworld" concept into specialized applications that suit the needs and interests of specific children. For example, using LOGO and sprites (user-definable graphics), Lawler designed a simple microworld for his three year-old daughter. The microworld was called Beachworld because it depicted a beach scene, complete with sky, water, and sand. It contained 20 graphic objects that could be activated by typing in the name of the object (sun, bird, truck) from four-by-six notecards. Lawler's daughter was also able to control speed and direction by typing the commands UP, DOWN, MOVE, TURN, SLOW, FAST, FASTER, and HALT. Because she had to use words to control her microworld, she learned to read the names of the 20 objects in only three months (having started with knowledge of only a few letters).

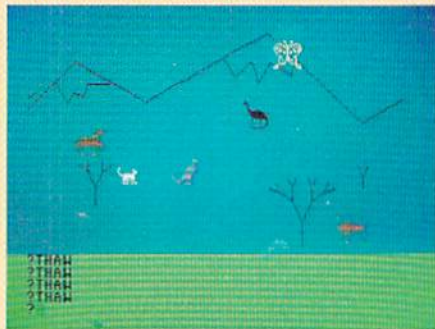
There are several differences be-

tween this method of improving reading skills and the typical drill method. First, the child's motivation came from her own interest in playing an exciting game—not from a desire to please someone else. Second, the software gave her control over the world—she could build a different Beachworld every time she played. Much like blocks and sand, such open-ended experiences tend to maintain the motivation to learn. Third, her learning of words was incidental to discovering all about Beachworld.

In other words, rather than drilling the child to death, and thereby teaching her that learning cannot be fun, this software capitalized on her natural tendencies to explore the world, to help her discover important concepts "on her own."

Many different kinds of simple microworlds can be programmed to provide playgrounds for mental development. In fact, children can be encouraged to perform mental gymnastics around any concept a parent or teacher chooses to imbed in these game-like worlds, because virtually any concept—from the complexities of geometry to the simplicity of "things that go inside or outside"—can be modeled or simulated in a microworld.

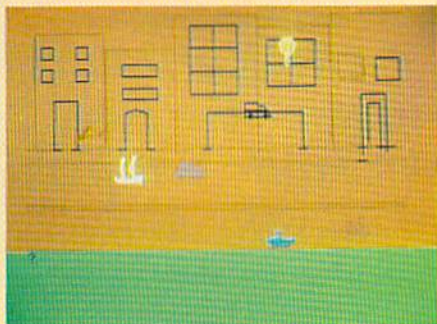
There are several reasons micro-



"Broadway," created by the author using LOGO, helps young children discover the names of different modes of transportation.

Turned loose in a computer microworld, young children can learn complex concepts while they "play."

worlds work well. First, when children work with microworlds, they are in control of much of the experience—the more sophisticated the microworld, the more control it provides the child. Lawler's daughter, for instance, was in control of what objects



"Utah" is a LOGO microworld created by the author to help his preschoolers learn animal names while they play.

While children are "playing" in the LOGO programming environment, they are also discovering important ideas in geometry.

appeared in Beachworld, when they appeared, how fast they went, and in what direction. A child drawing with LOGO can program the turtle to draw nearly anything he or she can imagine. This sense of control is an important part of the learning process.

Microworlds are also responsive to the child's previous experience and accumulated knowledge. Papert and Lawler both think this kind of learning is extremely important because it makes the experience personally meaningful to the child. For example, if a child is trying to draw a triangle with the LOGO turtle and makes a mistake, the child can literally walk through the activity required of the turtle. Thus, knowledge of his or her own body and movement through space can be applied to the problem at hand, which solidifies their understanding of what is really a problem in geometry.

Finally, microworlds are great for preschool children because keyboard requirements can be minimized. LOGO has already been simplified to

single-key requirements; most versions of LOGO contain a file called "Instant" on the utilities disk. Three-by-five cue cards can also be used, or the keyboard can be covered with an overlay that highlights the few keys necessary for software manipulation.

All of these factors make computer microworlds an effective way to give children access to "discovery learning." Perhaps one final positive aspect of microworlds should now be mentioned: They can be designed and programmed by the average parent using LOGO on a Commodore 64!

How You Can Create Microworlds

First, the Commodore 64 comes complete with everything you need in terms of hardware (sufficient memory, sprites, good color and sound) to create your own microworlds. Next, you'll need Commodore's LOGO for the 64, which was created by Terrapin, the leading LOGO developer in the U.S. With these materials, you are all set to open new worlds of discovery for your child. However, before I suggest some steps for the construction of microworlds, let me answer a couple of questions that might have come to your mind.

Can I do this all by myself? Yes! The documentation that comes with LOGO is well written and contains demonstrations and examples to help in your quest for understanding. Furthermore, Terrapin has not left you to start from the ground up. The utilities

Microworlds can be designed and programmed by the average parent, using LOGO on the Commodore 64.

disk for LOGO contains numerous support programs and procedures. You won't be alone either. Other family members, especially older siblings, will be interested in your exciting project. Some of little Peggy Lawler's microworlds were developed and programmed by her older brother

and sister (ages seven and eight).

How much time will this take? As with any computer application, from mastering a video game to learning word processing, microworld programming will require an initial investment of time. However, after you have programmed your first one, you will be able to make others in less time. Above all, the most time-consuming part of the project will very likely be in learning to use the sprite editor and defining sprite shapes (imagine a piece of graph paper where you fill in squares to make designs). Again, if your household contains curious older siblings or a willing spouse, put them to work. Family projects are often the most exciting of all.

Now, with those questions aside, we can look at one way to go about the construction of simplified microworlds (it will take a little more time to progress to ones as complex as that of Lawler) using a Commodore 64, 1541 disk drive, color television/monitor, and Commodore's LOGO. The steps that follow are general and intended only to get you started. Embellishments and improvements will be up to you.

First of all, you need to read and work through the documentation that comes with LOGO. This will give you an overview of how LOGO works, what sprites are, how to define them, and so forth. This may seem like quite an undertaking in itself, but I assure you it will help you avoid many a pitfall.



Second, pick a theme for your microworld. I have developed microworlds that teach simple concepts like inside/outside and variations of the type Lawler developed for his daughter. Currently, my children (two to five) enjoy two microworlds

Continued on pg. 117

DeluxePaint

Sophisticated Graphics for the Amiga

An exclusive first look at one of the most exciting graphics packages yet created for a personal computer—the first in a group of graphics programs from Electronic Arts that promises to change the way you think about your Amiga.

Reviewed by Louis R. Wallace

DeluxePaint from Electronic Arts has been called the best paint system ever created for a personal computer. Without reservation, I agree. This package lets you harness the power of the Amiga's graphics with ease, yet doesn't sacrifice any of the sophistication you've come to expect from that computer. DeluxePaint lets you create graphics as if you were using paint, but adds many features that are possible only because you are doing that "painting" on an Amiga.

The package contains all the features you've come to expect in a graphics system, such as dots, lines, boxes and circles. But it goes beyond these elementary functions, adding many special tools such as ellipses, rectangles and polygons, curved lines, airbrush and flood fills. It allows from 16 to 32 colors on-screen at one time, depending on the resolution you are using, and you can choose your palette from any of the 4096 colors the Amiga can generate. In addition, DeluxePaint lets you create pseudo-animation using a "cycle color" option that, by cycling through a range of colors, generates the illusion of motion.

You can use any of DeluxePaint's ten built-in brushes, or you can design your own. Self-designed brushes can be any size, any shape and up to 32 colors. And, of course, you can use any of the Amiga's text fonts in your pictures.

The program allows many special effects, too, such as "symmetry." This allows you to mirror your every action in up to 40 different directions, which means you can create very complex patterns in seconds—patterns that would be almost impossible to do by hand. You can magnify any area of the screen in order to do fine detail work. And, if the magnify feature isn't enough, you can use zoom to enlarge

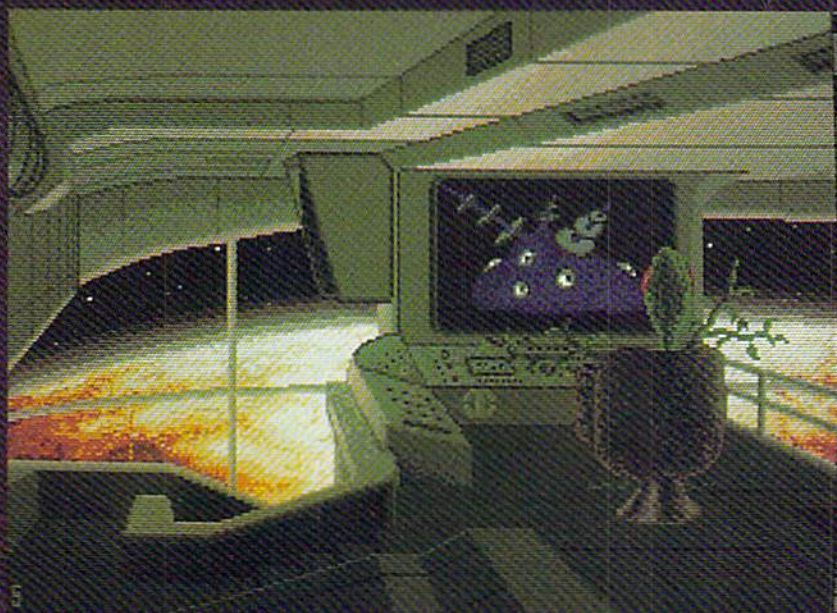
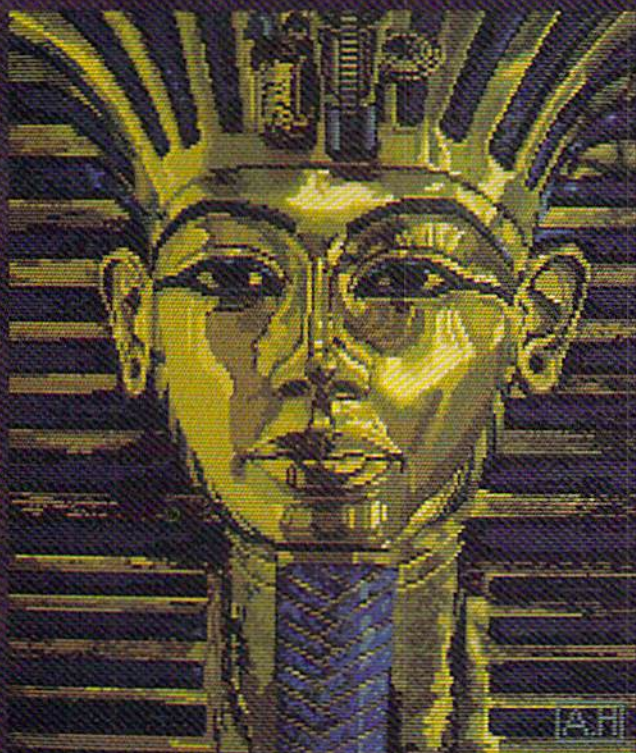
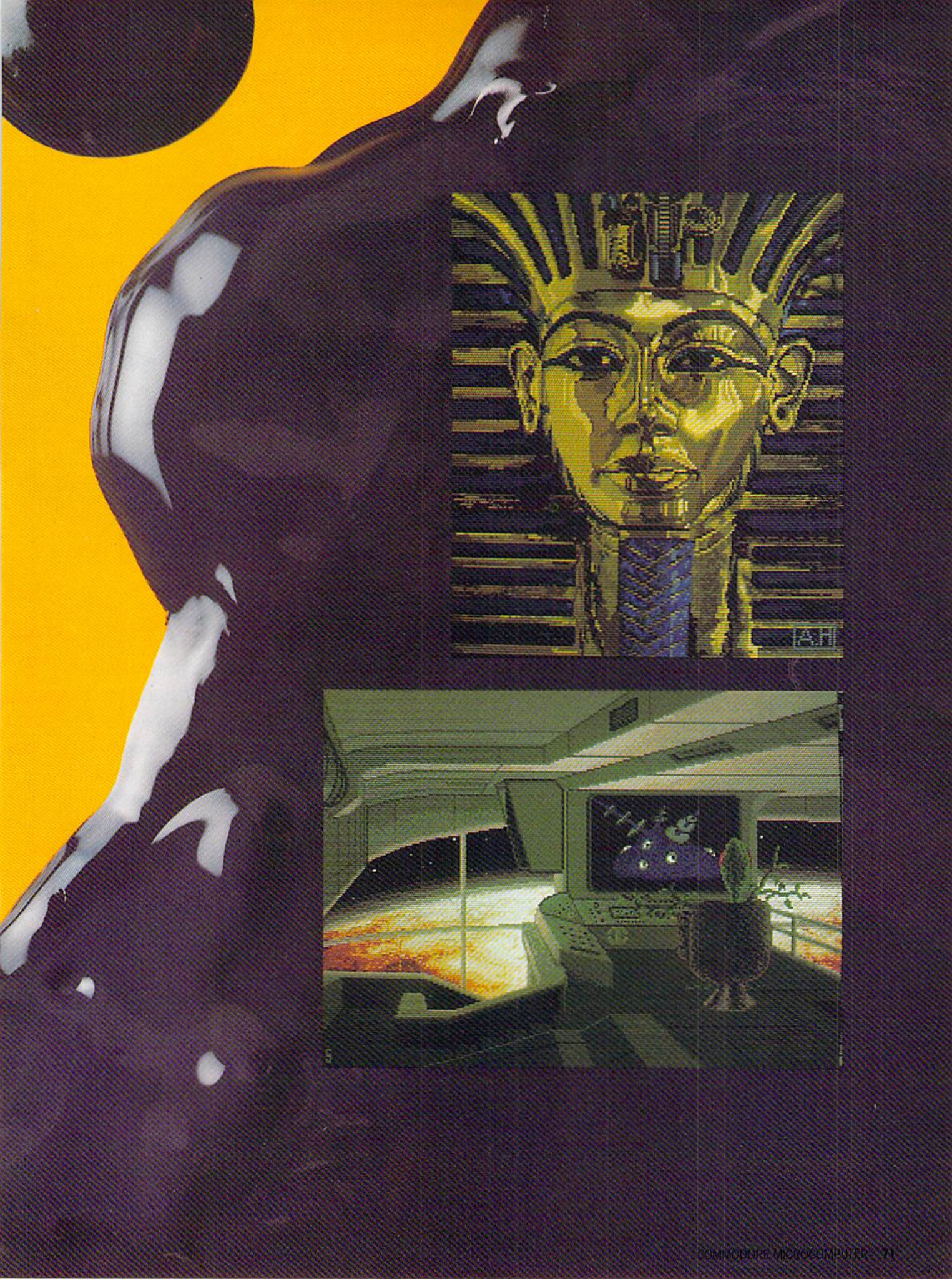
the area even more.

DeluxePaint uses the mouse to control the brushes in painting and drawing, and also to select options from the control panel and menus. The control panel is on the left side of the screen. It is here you select drawing tools like line, polygon or airbrush. You can also turn on the symmetry option, choose a color, clear the screen or undo a change you no longer want.

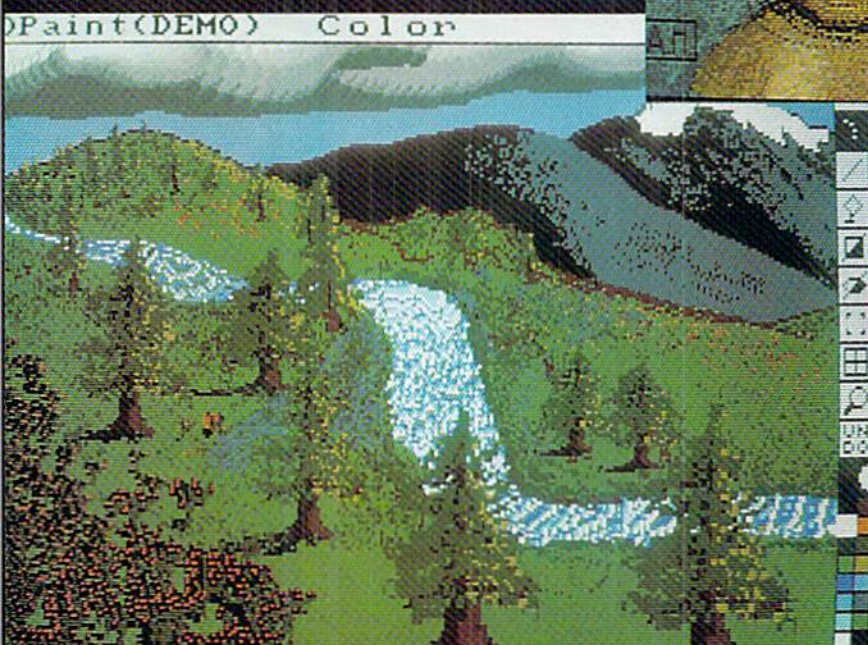
At the top of the screen is the title strip. When you move your mouse pointer here and click the right mouse button, several pop-down menus appear. These menus have additional options such as color palette selection and cycle color control, loading and saving of pictures and brushes, brush manipulations, such as sizing and rotation, printing your picture and many other functions.

Since the quality of your picture depends to a large extent on the brush you are using, let's take a good look at the options available for brushes. There are ten built-in brushes for immediate use. They are at the top of the control panel, and consist of dots, circles and squares in various sizes. You can select them by pointing with the mouse and clicking the left button. You can then use that shape for drawing in whatever color you wish to use.

If you select the brush using the right mouse button you can stretch or shrink it as much as you desire, so you have complete control over the size of your brush. Not only that, but anything can be used as a brush. On the control panel is an option



The "cycle color" option lets you create pseudo-animation.



completely within the rectangle, press the mouse button again and you have captured it as a brush. Now, as you move the mouse around the screen, your new brush will follow, and you can use it to draw or paint, or even use it as a stamp to make one or more copies. And it is important to remember that all the colors that were in the "brush" when you captured it are still there.

So you could easily draw with up to 32 colors at once.

This new brush can be re-sized using the "size" sub-menu. Here you can stretch the brush, double or halve its size, or even double it selectively in the horizontal or vertical directions.

Since the brush you create can be as large as the screen, this allows you to duplicate whole pictures, and reduce them to a fraction of their original size. You can also select a small part of the screen and enlarge it to whatever size you need.

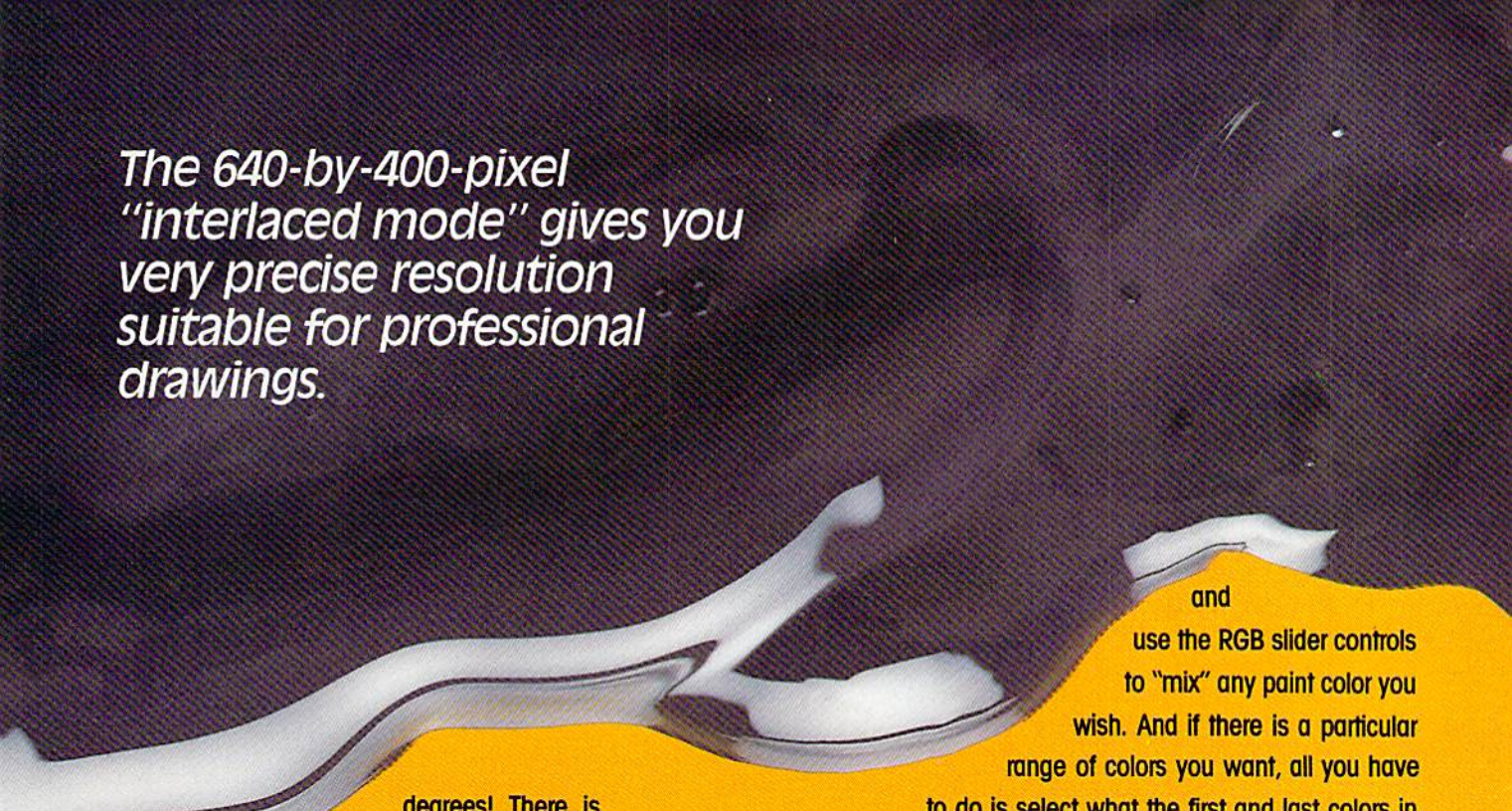
You can access even more options for adjusting the shape of the brushes. For instance, certain options will flip a brush—so it ends up either backwards or upsidedown. Or you can rotate the brush to any angle from 0 to 360

called the brush selection tool. When you choose this you are given a set of lines that act as a fullscreen crosshair. You pick the area of the screen you want to

use as a brush by moving the crosshair to the upper left of the area and clicking the left button once. By moving the mouse you can then surround the area with a rectangle.

Once you have the object you wish to use as a brush

*The 640-by-400-pixel
"interlaced mode" gives you
very precise resolution
suitable for professional
drawings.*



degrees! There is also a feature called "shear," which anchors the top of the brush image, holding it still, while you are free to move the bottom from left to right. This can provide very striking visual effects.

Because you can save brushes to disk, you can build a library of shapes and images to be used later as paint-brushes, or even as components for creating whole pictures. In fact, there are several brush libraries already on the disk to get you started. One set is made of Christmas objects; two others contain everything you need to create castles, moats, dragons and wizards.

Additional brush commands let you do things that you would have thought only real paint would allow. The first is "smear," which has the same effect as smudging wet paint with your finger, smearing the image and allowing the paint to mix together. "Blend" and "shade" operate within a range of colors determined by you. Blending creates an average color, based upon what's already there. "Shade" lets you lighten or darken the colors under the brush, depending upon which mouse button you are pressing at the time. These options smooth the contrasts between colors, creating very "painterly" effects.

As I mentioned, you can use from 16 to 32 colors on one screen (depending on the resolution mode you are in) out of a total of 4096 different colors. To create a custom color, choose the "color palette" option from the title strip. Indicate which one of the color cells you want to modify,

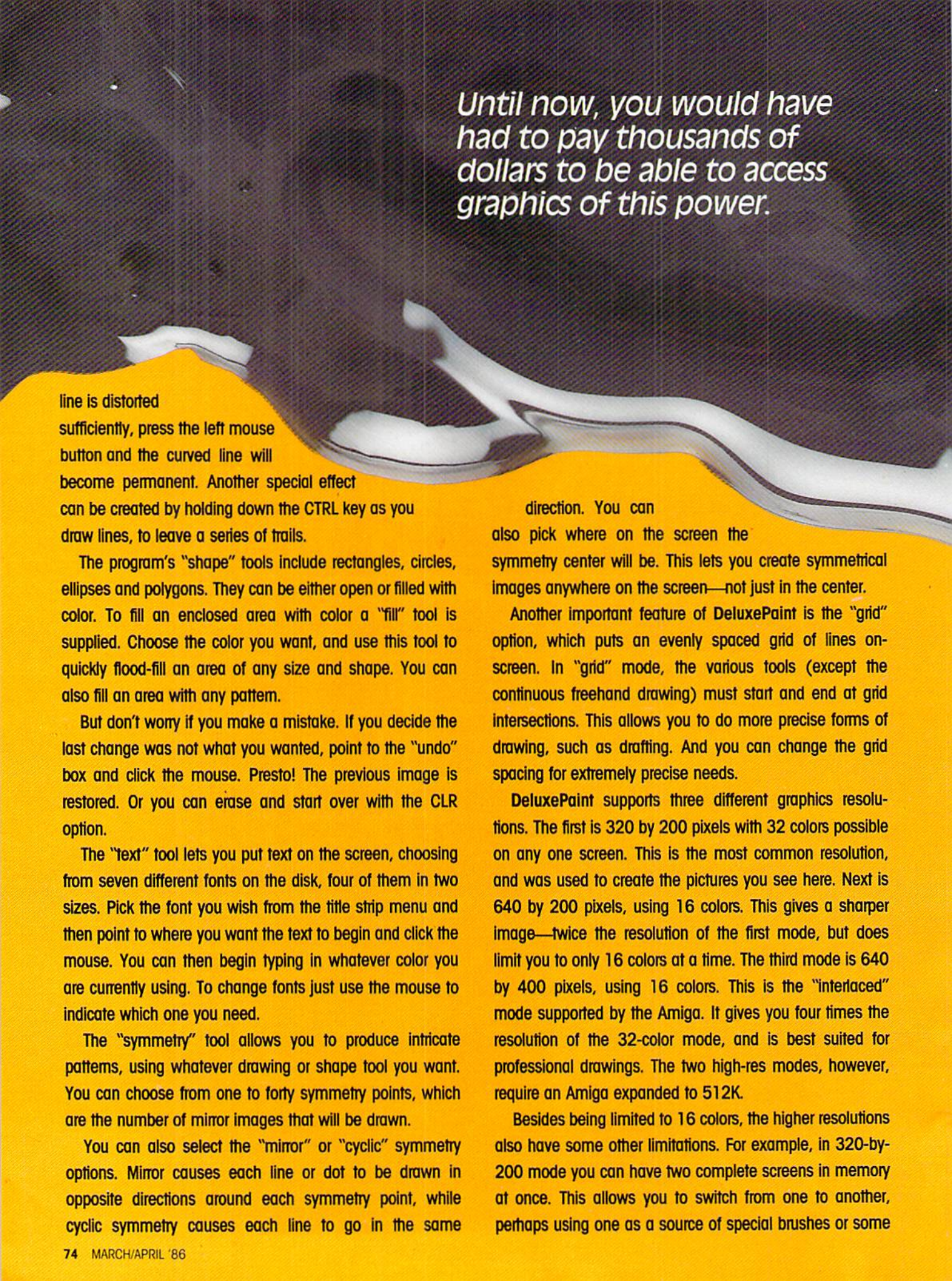
and use the RGB slider controls to "mix" any paint color you wish. And if there is a particular range of colors you want, all you have

to do is select what the first and last colors in the range should be. DeluxePaint will automatically create the proper shades in between.

Not only can you use any of 4096 colors, but you can create pseudo-animation by using the "cycle color" option. This allows you to determine a range of colors, (and cycle through that range) at a given speed. By carefully planning your picture, you can use this option to give motion to your art. For example, the "Waterfall" demo included with the package uses this option to create the illusion that the water is flowing.

DeluxePaint has many other drawing and painting tools, as well. If you choose to draw freehand, you can use either continuous freehand (no breaks in the line) or dotted freehand (the space between dots depends on how fast you draw). You can use the "airbrush" option to draw with a paint spray, adjusting the nozzle width from a wide spray down to a narrow one. Airbrush is particularly effective when you are using the "blend" and "shade" brush options.

To draw a straight line just choose the "straight line" tool and put the mouse pointer where the line is to start. Then drag the line (with the button depressed) to where it is to end, and release the button. The line will then be drawn. If you have need of a curved line DeluxePaint is ready to help. Select "curved line" and make a line from two endpoints as before. Then move the mouse; the line will curve in response to the position of the mouse pointer. When the



Until now, you would have had to pay thousands of dollars to be able to access graphics of this power.

line is distorted sufficiently, press the left mouse button and the curved line will become permanent. Another special effect can be created by holding down the CTRL key as you draw lines, to leave a series of trails.

The program's "shape" tools include rectangles, circles, ellipses and polygons. They can be either open or filled with color. To fill an enclosed area with color a "fill" tool is supplied. Choose the color you want, and use this tool to quickly flood-fill an area of any size and shape. You can also fill an area with any pattern.

But don't worry if you make a mistake. If you decide the last change was not what you wanted, point to the "undo" box and click the mouse. Presto! The previous image is restored. Or you can erase and start over with the CLR option.

The "text" tool lets you put text on the screen, choosing from seven different fonts on the disk, four of them in two sizes. Pick the font you wish from the title strip menu and then point to where you want the text to begin and click the mouse. You can then begin typing in whatever color you are currently using. To change fonts just use the mouse to indicate which one you need.

The "symmetry" tool allows you to produce intricate patterns, using whatever drawing or shape tool you want. You can choose from one to forty symmetry points, which are the number of mirror images that will be drawn.

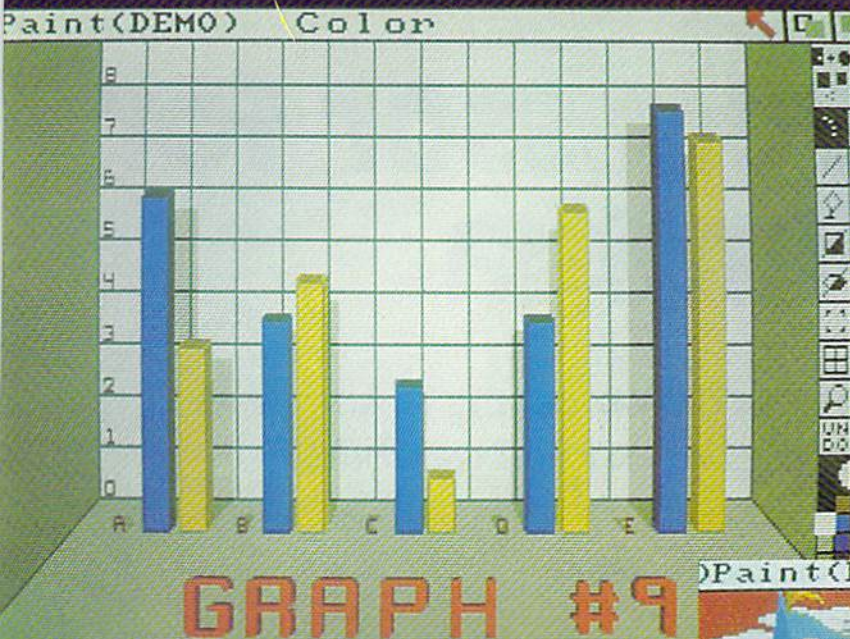
You can also select the "mirror" or "cyclic" symmetry options. Mirror causes each line or dot to be drawn in opposite directions around each symmetry point, while cyclic symmetry causes each line to go in the same

direction. You can also pick where on the screen the symmetry center will be. This lets you create symmetrical images anywhere on the screen—not just in the center.

Another important feature of DeluxePaint is the "grid" option, which puts an evenly spaced grid of lines on-screen. In "grid" mode, the various tools (except the continuous freehand drawing) must start and end at grid intersections. This allows you to do more precise forms of drawing, such as drafting. And you can change the grid spacing for extremely precise needs.

DeluxePaint supports three different graphics resolutions. The first is 320 by 200 pixels with 32 colors possible on any one screen. This is the most common resolution, and was used to create the pictures you see here. Next is 640 by 200 pixels, using 16 colors. This gives a sharper image—twice the resolution of the first mode, but does limit you to only 16 colors at a time. The third mode is 640 by 400 pixels, using 16 colors. This is the "interlaced" mode supported by the Amiga. It gives you four times the resolution of the 32-color mode, and is best suited for professional drawings. The two high-res modes, however, require an Amiga expanded to 512K.

Besides being limited to 16 colors, the higher resolutions also have some other limitations. For example, in 320-by-200 mode you can have two complete screens in memory at once. This allows you to switch from one to another, perhaps using one as a source of special brushes or some



Self-designed "brushes" can be any size, any shape and up to 32 colors.



other type of template, as a scratchpad, or for making pattern fills. You do not have this extra screen when in the higher resolution modes.

You are also limited in the size the brush can be in these upper graphics modes. The reason is simple. These very high-resolution screens require a great deal more memory than the low-resolution screens.

If you have a printer hooked to your Amiga, it is very easy to get a hardcopy of your pictures. DeluxePaint uses the same printer drivers as the normal Workbench disk, so a large number of black and white dot matrix printers can be used. It also supports color and laser printers too, so it is possible to get very high quality reproductions of your work.

It is also possible to use the keyboard instead of the mouse/menu/icon system to activate many of the functions of DeluxePaint. Once you have the keyboard commands committed to memory, you can use them to save time in performing certain functions.

I am extremely pleased with DeluxePaint, and believe it is without doubt an exceptional buy at \$79.95. Until now, you would have had to pay many thousands of dollars to

be able to access graphics of this power. If you are a professional artist or graphics designer you would be well advised to look at DeluxePaint. If you have need of presentation-quality graphics or just want to have fun painting pictures on the Amiga, this system is for you. I can highly recommend it.



A Word Processor for the Amiga

Textcraft succeeds in making word processing as simple as possible, yet still offers very professional capabilities.

Reviewed by Louis R. Wallace
and Sharon A. Key

More than any thing else, microcomputers are used as word processors. So it's no wonder that one of the first productivity programs for the Amiga is just such a product. It is called Textcraft, and is available from Commodore Amiga dealers.

Experienced word processor users will find Textcraft different from those they are used to working with. And, people new to word processing will find it very easy to use and quick to learn. This is because Textcraft is an icon-based program that is best controlled by using the Amiga mouse.

Icons are pictures that are used to convey ideas. In the case of Textcraft, these pictures represent the various activities that word processors perform—activities like cut-and-paste, formatting text, line spacing, block copying, block deleting, and so on. For example, if you wish to delete a section of a document, what could be more

natural or intuitive than using scissors to cut it out? Textcraft uses just such an icon, a small scissors that you use to indicate what area of the document is to be cut. If you want to paste it somewhere else instead of deleting it, you would then, of course, choose the camera icon to take a picture of the area, then the glue bottle icon to paste it.

Virtually every aspect of word processing within Textcraft is controlled by icons or the accompanying menus. You use icons to set your line spacing and to justify all or part of your document. You use them to center text, to copy text and even to set your margins.

Textcraft has a ruler (seventy-five characters wide) at the top of the screen, with two little red markers that indicate where the left and right margins are. To change them you move the mouse pointer (it looks like a pencil) to the margin indicator you wish to change. When you reach the ruler your pencil becomes a hand that grabs the red

The word "Textcraft" is rendered in a large, bold, sans-serif font. The letters are filled with a dense pattern of small blue dots on a white background. The word is positioned at the bottom of the page, spanning most of its width.

If you find using the mouse to be a little slow, use one of *Textcraft's* many help screens to learn how to give commands directly from the keyboard.



marker and pulls it in the direction you desire. Letting go of the mouse button leaves the marker at its new position, and the new margin is set. It is quick and easy (like most of *Textcraft's* controls) and takes effect immediately.

Other functions are accessed by using the mouse icon to touch one of the five small menu windows at the top of the screen. Pressing one of the mouse buttons causes a pop-down menu to appear, which offers various options like text styles (bold, italic, underline, superscript and subscript), page size, screen layout or even searching and replacing text.

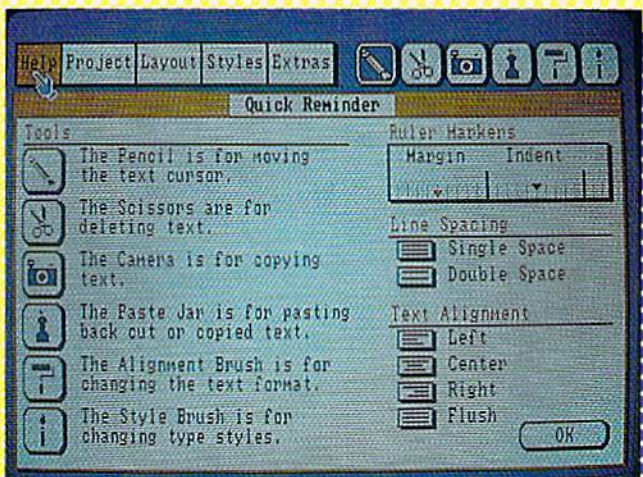
Perhaps you are wondering just how effective a word processor can be that relies so heavily on icons instead of the keyboard? After all, word processing is basically a typing function, one that requires you to use the keyboard to enter text. Don't these icons get in the way of "serious" word processing?

The answer is no, and we are admittedly surprised. Both of us are used to the more traditional kinds of word

processors, and at first glance we thought *Textcraft* would be cute, but limited because of the icons. The fact is that not only is it easy to learn, it is also remarkably advanced, especially for a program that is billed as an entry-level word processor.

Word processing is popular because it makes writing easier, while at the same time allowing you to do complex types of composition. *Textcraft* succeeds in making word processing as simple as possible, yet still offers very professional capabilities. In fact, some of its features completely outshine programs costing several times as much.

Textcraft's "Quick Reminder" help screen lets you brush up on the meaning of each of the program's icons.



One of the features that distinguishes *Textcraft* from others is the built-in document formats. You can choose from six different document types, such as term paper, business letter, technical report or resume. You are then asked for information to be entered into the document. Depending on the document, this could be as little as your name and address, or as much as your employment or educational history. This information is then entered in your

Textcraft

document in the proper format, saving you quite a bit of time. And if you don't already know what the proper format should be you will find Textcraft more than just a time saver. It becomes a skilled personal secretary. I think many people will find this feature alone worth Textcraft's price. As a result, if your printer is good enough, you may find that expensive resume services are a thing of the past.

Textcraft has other features that add to its user friendliness. It contains very extensive help screens that almost do away with the need for written documentation. By moving the mouse pointer to the menu labeled **HELP** and clicking the right button you are offered three different types of help.

Using the built-in document formats in Textcraft, you fill in information for standard documents like resumes, term papers or business letters. The program then formats the document properly, using the information you have supplied.

The screenshot shows the 'Business Letter' form within the Textcraft application. The menu bar at the top includes 'Help', 'Project', 'Layout', 'Styles', and 'Extras'. The 'Layout' menu is currently open, showing options for 'Page Number and Titles'. The form itself has two columns for 'Sender' and 'Recipient' information. Fields include 'Form of Address' (with radio buttons for Mr, Mrs, Ms, Dr), 'First Name', 'Last Name', 'Company Name', 'Company Address' (with sub-fields for street and city), 'Job Title', 'Typist's Initials', 'Date', 'Carbon Copy' (with a text field), 'Format' (with radio buttons for Full-block and Semi-block), and 'Enclosure' (with radio buttons for Yes and No). 'OK' and 'Cancel' buttons are at the bottom right.

Business Letter		
Form of Address:	Sender: <input checked="" type="radio"/> Mr <input type="radio"/> Mrs <input type="radio"/> Ms <input type="radio"/> Dr	Recipient: <input checked="" type="radio"/> Mr <input type="radio"/> Mrs <input type="radio"/> Ms <input type="radio"/> Dr
First Name:	Charles	Jane
Last Name:	Everyman	Everywoman
Company Name:	Any Company	This Company
Company Address:	Main Street	Side Street
	Anytown, U.S.A.	Everytown, U.S.A.
Job Title:	Pres.	Chairperson
Typist's Initials:	zzp	Date: 1-1-87
Carbon Copy:	jgk	
Format:	<input checked="" type="radio"/> Full-block <input type="radio"/> Semi-block	
Enclosure:	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<input type="button" value="OK"/> <input type="button" value="Cancel"/>		

The first is called **Quick Reminder**, and by choosing it you are instantly transferred to a screen that shows all the icons available on the work screen. Each has a brief description of its function, just in case you're not sure of what it is. You can then quickly return to your document by

Set up your page layout using Textcraft's Layout screen.

The screenshot shows the 'Page Number and Titles' layout screen. It has a menu bar with 'Help', 'Project', 'Layout', 'Styles', and 'Extras'. The 'Layout' menu is open. The screen contains settings for 'Header' and 'Footer' locations (Left, Center, Right) and page numbering (Displayed: Yes/No, Location: Left/Center/Right, Type: Page 1, I-, I, (I), IV, and Starting page number: 1). An 'OK' button is at the bottom right.

Page Number and Titles	
Header:	
Location:	<input type="radio"/> Left <input checked="" type="radio"/> Center <input type="radio"/> Right
Page numbering:	
Displayed:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Location:	<input type="radio"/> Left <input checked="" type="radio"/> Center <input type="radio"/> Right
	<input type="radio"/> Top <input checked="" type="radio"/> Bottom
Type:	<input checked="" type="radio"/> Page 1 <input type="radio"/> I- <input type="radio"/> I <input type="radio"/> (I) <input type="radio"/> IV
Starting page number:	1
Footer:	
Location:	<input type="radio"/> Left <input checked="" type="radio"/> Center <input type="radio"/> Right
<input type="button" value="OK"/>	

simply clicking the mouse.

The next form of help is the **Keyboard Reference**, which is a highly accurate picture of the Amiga keyboard, showing which keys have special functions in Textcraft. Almost every function can be accessed from the keyboard without using the mouse. So those users who, for one reason or another, do not wish to use the mouse can rely instead on the keyboard.

In fact, we think the most efficient use of Textcraft is achieved by combining mouse and keyboard functions. The mouse lets you get to work immediately, but once you have gained some experience with the system you will find the keyboard commands are faster than the icon/menu approach. The keyboard controls fine tune the word processor's power, so you can move from page to page, screen to screen or top to bottom by simply pressing a key. Just as the Amiga can be controlled without ever touching the mouse, so can Textcraft. But you will probably want to use the mouse, too!

Textcraft

The third built-in help is called **One-Minute Tutorials**. These are short text and animation sequences that demonstrate the functions of **Textcraft**. When you choose this option, you are transferred to a menu of over twenty different tutorials that cover almost everything concerning the program. The tutorials include animated demonstrations that explain how to edit your document and how to change type styles. They will help you determine the best layout for your document, show you how to search and replace text, or set up the screen display. And when it comes to creating, opening, saving or printing your document, you can turn to these tutorial "films" for information and guidance. You will never need to get up and look for the misplaced manual again.

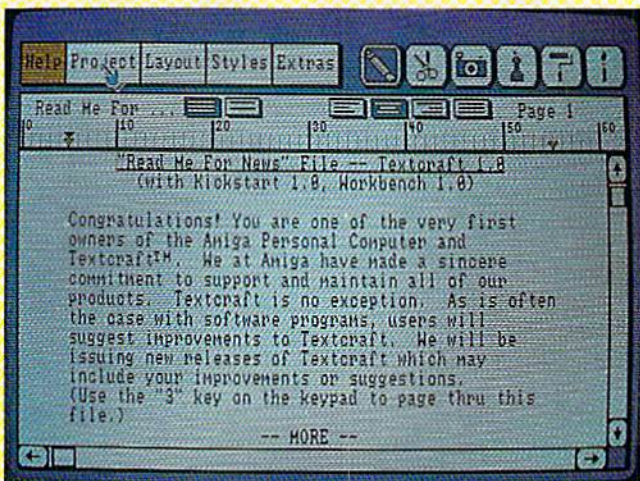
The **Textcraft** disk contains versions for both 256K and 512K or larger Amiga systems. The disk is not copy protected, so you can make a backup (and are urged to do so in the manual) using the AmigaDOS command disk-copy. This means you should have no problem transferring it to a hard drive.

I used the 512K version for this review, and found it capable of holding a large number of pages in memory. Using block copy to create a large document from a small one, I was able to get 135 pages in memory at one time. That's more than enough for most uses, but for those who write larger documents (like books or dissertations) you can break the document up into several (smaller) files on disk. Since the Amiga can store up to 880K (880,000 characters) on a single disk, you don't have to shuffle disks around, as you do on other systems.

The only "standard" features missing from the package are footnoting capabilities and a spelling checker. (Footnotes are usually references to authors' names, books or

journals which were mentioned on that page. They should not be confused with footers (or headers) which enter the title of the document and the page number on each page, and are supported by **Textcraft**.) Spelling programs have become valuable aids in word processing, and it seems very likely that one compatible with **Textcraft** will eventually be marketed. With those two exceptions, the program is quite complete.

A few pages of sample text pre-stored on the **Textcraft** disk let you see how formatted text looks.



To summarize, **Textcraft** is a well designed word processing package that takes advantage of the Amiga's graphics and large memory. It is suitable for beginners and experienced word processor users alike, and its friendly format allows you to quickly begin working. It contains very extensive built-in documentation with animation sequences that demonstrate how to use the program. And it comes with many ready-to-use formats that will simplify the creation of professional looking documents. If you have need of a word processing system on your Amiga we think **Textcraft** is well worth looking at.

Textcraft

HOW TO TO A HIGHER



THE COMMODORE 128.

The first step is buying the Commodore 128™ Personal Computer. The smartest computer available for the price. It's like getting three computers for less than one usually costs, because the 128 operates in three separate modes. You can run sophisticated CP/M® business software and the new programs written for the 128. Plus over 3,000 Commodore 64® programs. You start out with more software and real life uses than most machines give you after years on the market.



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To run all that software and run it faster, you'll want the 1571 Disk Drive. You can't find a faster drive at the price. It transfers nearly 1,000 words a second (5200 cps), so you can load most programs instantly. And you'll save space as well as time because the 1571 holds up to 410K of data, the equivalent of 200 typewritten pages.



THE COMMODORE 128 GETS SMARTER.

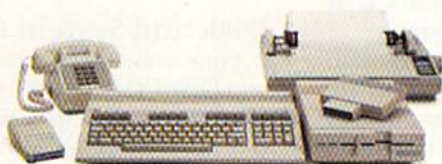
Now try improving your memory. Plug in our 1750 RAM Expansion Module and your 128 moves up to a powerful 512K. That's enough to handle just about anything you can dish out, from complicated business forecasting to giant data bases. In fact our expansion module will be the only memory you'll need for many years to come.

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THE COMMODORE 128 LEARNS TO WRITE.

Looking good in print could be your next move with the MPS 1000 Printer. It's a new dot matrix printer designed to make the most of the 128's high-resolution graphics because sometimes pictures speak louder than words. But it's no slouch when it comes to words. The MPS turns out about 1200 words a minute (100 cps) of draft-quality printing, or gives you near-letter-quality printing at nearly 240 words a minute (20 cps). And you can choose printing styles, use international characters, even make up your own symbols.



THE COMMODORE 128 IMPROVES YOUR VISION.

Brains aren't enough without good looks, so improve your vision with Commodore's new 1902 RGB Color Monitor. The high-resolution screen gives you a sharper image and better color than your standard TV, so you can really appreciate the 128's great graphics. And the 80-column display lets you see more of what you're doing while you're doing it.

All these evolutionary steps ahead won't set you back when it comes to paying for them. Additions to your Commodore 128 are available at a store near you and are as affordable as the 128 itself. We think that's a smart way to help you build a computer system.

COMMODORE 128 PERSONAL COMPUTER
A Higher Intelligence

Amiga CLI Guide

A brief guide to the most commonly used AmigaDOS commands.

In addition to Workbench, the Amiga has a second user interface called the Command Line Interpreter (CLI). This interface allows more direct access to many of the features of AmigaDOS and is similar to CP/M® and UNIX® in many ways. To use the CLI you type in commands, and when you press RETURN, they are passed to AmigaDOS.

The Amiga is shipped with the Workbench interface enabled and the CLI disabled. In order to use the CLI, it must first be enabled from Preferences (see Chapter 7 of *Introduction to Amiga*). Once it is enabled, you can select the CLI icon in the System drawer of Workbench.

The *AmigaDOS Manual*, published by Bantam Books and available from your Amiga dealer or your local bookstore, provides a complete description of all the commands available in the CLI. In this article we will briefly describe the most common commands.

Devices

The CLI assigns each input and output device a name. These names allow you to specify exactly where data is coming from and going to. The use of names eliminates the need for the device numbers used in the other Commodore computers. Each name consists of three characters plus a colon. The colon is required at all times. The most often used devices are:

df0:—Drive 0. This is the drive built into the Amiga.

df1:—Drive 1. This is the first 3-1/2 inch external drive.

ram:—RAM. You can use "ram:" just as you use the drives.

prt:—This is the current printer, as selected in Preferences.

CLI Control Commands

Three of the commands used to control the CLI are NEWCLI, ENDCLI, and RUN. Because the Amiga is capable of multi-tasking, each CLI opened is a separate task. What is running in CLI 1> is independent from what may be running in CLI 2>. If there is enough memory, you can open up to 20 CLI's.

NEWCLI

Create a new CLI task.

ENDCLI

End a CLI task.

The RUN command allows you to create a new CLI



and run a program in it. Using RUN to start AmigaBASIC, for example, will allow you to pull the BASIC screen down and go back to use CLI commands.

RUN amigabasic

Create CLI 2> and run Amiga BASIC in it.

Disk and System Commands

Four commonly used disk commands in AmigaDOS and DISKCOPY, FORMAT, INSTALL and RELABEL. DISKCOPY is similar to a backup command; everything on one disk is copied on the other. There is no need to format the destination disk and anything on it will be overwritten. FORMAT is used to format and initialize a new disk. This must be done before files can be saved to a disk. If a disk has already been formatted and you reformat it, all data on the disk will be destroyed. INSTALL puts the routines to create a bootable disk onto a formatted disk. RELABEL is used to change the name of a formatted disk.

DISKCOPY df0: TO df0:

One drive system.

DISKCOPY df0: TO df1:

Two drive system.

FORMAT DRIVE df0: NAME "mydisk"

Format disk in df0: as mydisk.

INSTALL df1:

Two drive system.

INSTALL ?

One drive system. The question mark forces the CLI to ask you to specify the drive. This allows you to remove your Workbench disk and insert the disk you want installed. Then type df0: and press RETURN.

RELABEL mydisk: new name

Change name from mydisk to newname.

DATE is a system command which sets or displays the current date and time. This information is used to date stamp every file that is created or modified. The date is not saved when the command is executed (use Preferences to save the date). Each day that you work on the Amiga the date should be set.

DATE

Displays the current time and date.

DATE 02-dec-85

Sets the date at December 2, 1985.

AMIGA UPDATE

DATE 11:45

Sets the time for 11:45AM.

DATE friday

Sets the date for the Friday following last saved date.

Directory and File Commands

AmigaDOS works with files, directories and subdirectories. When you first enter the CLI, all file access defaults to the main directory of drive zero. Commands available include DIR, LIST, CD, TYPE, COPY, DELETE and RENAME. DIR and LIST are two ways to look at the names of all files in the directory. CD allows you to redefine which directory or subdirectory is the default. TYPE allows you to see the contents of a file. COPY and DELETE allow you to copy files between directories or disks and delete selected files.

DIR df0:

Show filenames and subdirectories in df0:

DIR df0:c

Show filenames and subdirectories in subdirectory c.

DIR df1:

Show filenames and subdirectories in df1:

The LIST command not only shows the name of the files, but also the protection level, the date they were last modified and their size in bytes.

LIST df0:

Show files in df0: main directory.

LIST df0:c

Show files in subdirectory c.

LIST df0: to prt:

List directory to printer.

The CD command lets you redefine the current directory. The main (root) directory of drive zero is default. Using the CD command alone will show the name of the current directory.

CD

Show the name of the current directory.

CD df0:c

Change current directory to subdirectory c.

CD ram:

Change current directory to RAMdisk.

The MAKEDIR command allows you to create a new subdirectory on your disk. The subdirectory can even be nested in another subdirectory.

MAKEDIR tests

Create a directory called "tests."

MAKEDIR df1:c

Create a directory "c" on drive one.

The TYPE command allows you to list the contents of a file to the screen. If the file is not a standard ASCII text file, unusual characters may print on your screen. Choosing option h displays the code in hexadecimal. Use the spacebar to pause the listing, the BACKSP key to restart and a CTRL-C to terminate the listing.

TYPE df0: myfile

List myfile from drive df0:

TYPE df0: data OPT h

List data file in hexadecimal

TYPE mydisk: myfile

List myfile on mydisk (will prompt for swap).

The COPY command can be used to copy either

The AmigaDOS Manual, published by Bantam Books, provides a complete description of all the commands available in the Amiga's Command Line Interpretation (CLI). Here, we briefly describe the most commonly used CLI commands.

single files, groups of files or entire directories. An entire directory can only be copied to another directory. Use the MAKEDIR command to create the new directory if necessary.

COPY df0: myfile TO df1:myfile

Copy myfile on a two drive system.

COPY df0: c TO df1:c

Copy directory "c" between drives.

COPY df0: myfile TO prt:

Copy (list) myfile to printer.

To copy files on a single drive system, the command files "copy" and "cd" must first be copied to ram:. To do this use the commands

COPY df0:c/cd TO ram:cd

COPY df0:c/copy TO ram:copy

Next use the command CD ram: to make the ramdisk the current directory. To copy the file "myfile," put the disk with myfile in the drive zero. Copy the file to the ramdisk using:

COPY df0:myfile TO ram:myfile

Insert the destination disk and copy the file from ramdisk using:

COPY ram:myfile TO df0:myfile

Use the command CD df0: to make df0: the current directory.

The DELETE and RENAME commands will delete or rename a specified file or directory of files.

DELETE df0: myfile

Delete myfile from the disk in drive df0:

RENAME FROM df0:myfile TO df0:newname

Rename myfile to newname.

Conclusion

The CLI in AmigaDOS is a powerful interface for working and manipulating files. In addition to the commands described here, there are two editors—ED (a screen editor), and EDIT (a line editor)—and commands for creating executive command files. These files are what put you into Workbench when you power up the computer, and can be used for executing many system functions. To find out more about all of the CLI commands and AmigaDOS in general, see the *AmigaDOS Manual*.



Any Printer/64

I had a problem. I bought a NEC brand printer because I liked the quality of the print and its speed. But it would not print Commodore graphics. When I tried to print a listing containing Commodore graphics, strange things happened. Sometimes I got garbage, sometimes the printer dropped entire lines of code, and sometimes it simply stopped.

I had three options: 1. Never list anything containing Commodore graphics. 2. Buy a Commodore printer or an interface which translates Commodore graphics to my printer, or 3. Write a program to do the translation for me. I chose option three. The result is Any Printer/64.

Any Printer/64 translates Commodore graphics and tokens into English or ASCII, which any printer can understand and print. It was written for and tested on a Commodore 64, but with two minor changes, should work with the VIC 20 as well. The resulting translation can be printed to your printer or, if you prefer, to your monitor or TV.

This program will translate both PRG (program) and SEQ (sequential) files. So if you have a SEQ file, the contents of which are a mystery, Any Printer/64 can read and translate the file for you.

There is also a skip option, which allows you to jump into the middle of the file or program before printing. This saves some time and lots of paper, if you need only a section of a program or file translated. Also, the "F1" key allows you to stop printing at any point. So you don't have to print the entire program or file, once you have the section in question.

There are three different groups of Commodore users who will find use for Any Printer/64: those who own a brand of printer other than Commodore, those who own Commodore printers, but have trouble understanding Commodore graphics, and those who have trouble understanding Commodore graphics, but do NOT own a printer. Any Printer/64 will translate to the screen as well as a printer.

If you've ever tried to tell the differ-



ence between CHR\$(125), CHR\$(121) and CHR\$(98) when they're printed, you'll appreciate Any Printer/64. Each of those three CHR\$(s) prints a vertical line, the height of the cursor, but in a slightly different position. The differences can be determined only by comparing the three side by side. Any Printer/64 translates them into ASCII and prints the ASCII code like this: CHR\$(98). It also translates other codes, such as the color keys or cursor controls, into English.

For example, the cursor-down symbol would be translated to (CRSR D). The funny symbol displayed when function key 1 is printed inside quotes is translated to (F1). The color codes are translated to (RED), (GREEN), etc.

I like to study listings to see how other people solve programming problems. Public domain programs as well as commercial programs are full of ideas and techniques worth studying and duplicating. But if you have to translate all those graphics, or, even worse, own a printer other than Commodore, which might even drop some valuable code, your studying can be severely curtailed. Any Printer/64 is the solution to these problems.

To use Any Printer/64, you must first have the program or file you wish to print stored on a disk. Then you should type the listing very carefully. Make sure all the commas and semicolons are just as they are listed. Save your listing before running it the first time.

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After you run Any Printer/64, insert the disk that contains the program or file you wish to print. There will be a quick title, then you'll be asked if you want to view the disk directory in order to get the correct spelling of the desired file or program. A simple RETURN defaults to "No." If you choose "Y," the disk will spin and a portion of the directory will be displayed. When the correct program or file is displayed, note the correct spelling of its name and whether it is a program or sequential file. Then input "Y." Any Printer/64 will next ask you to input the correct file name. Be careful to duplicate it just as it appears in the directory.

Now you'll be asked if the file is a "P" or "S." "P" stands for a program file and "S" for a sequential file. The directory listing includes this information.

Then Any Printer/64 asks where you want the printout to go. Do you want the display to appear on "S" for screen or "P" for printer? Answer and press RETURN.

Next you are asked if you wish to

Translate special Commodore graphic characters into English or ASCII.

skip past some bytes before the printing begins. Pressing RETURN defaults to none. If you are familiar with the file or program you are about to print and know that all the information you are curious about is in the middle or near the end of the file, you can use this option to skip past some information to save time and paper. Don't worry about the skipping. If you skip too far or not far enough, nothing bad should happen. It's just a time- and paper-saving option. You probably will use it often, after you feel comfortable with Any Printer/64.

At any time, while the program is reading and printing, you can abort by pressing the "F1" function key. This will close the disk and printer chan-

nels and return the program to the "TRY AGAIN (Y/N)" screen.

Any Printer/64 was written for use on a Commodore 64 and Commodore 128 in 64 mode. But as far as I can tell, it should also work on the VIC 20 if two POKES are changed. Line 1 POKE53281,0 pokes the screen to black. Line 20 POKE53280,0 pokes the border black. VIC 20 users should change those or simply eliminate the POKE commands entirely.

Everything else in Any Printer/64 is Commodore BASIC and should work on both the VIC and 64. But I do not own a VIC 20 and thus have not tested it on one. (Note: If you are using a VIC 20, do not enter the apostrophe and four letters at the end of each program line when you type the listing.)

Examples of How it Works

Because Any Printer/64 is written in BASIC, your printer will stop and start as it sorts through the translation codes. I tried to locate the most often used code near the top of the program, to increase speed.

Examples one, two and three show

Example 1. Using a Commodore printer with graphics

```
10 PRINT "Q"
20 PRINT "W"
30 PRINT "E"
40 PRINT "R"
50 PRINT "T"
60 PRINT "Y"
70 PRINT "U"
80 PRINT "I"
90 PRINT "O"
100 PRINT "P"
110 PRINT "A"
120 PRINT "S"
130 PRINT "D"
140 PRINT "F"
150 PRINT "G"
160 PRINT "H"
170 PRINT "J"
180 PRINT "K"
190 PRINT "L"
200 PRINT "Z"
210 PRINT "X"
220 PRINT "C"
230 PRINT "V"
240 PRINT "B"
250 PRINT "N"
260 PRINT "M"
270 PRINT "1"
280 PRINT "2"
290 PRINT "3"
300 PRINT "4"
310 PRINT "5"
320 PRINT "6"
330 PRINT "7"
340 PRINT "8"
350 PRINT "9"
360 PRINT "0"
370 PRINT "+"
380 PRINT "-"
390 PRINT "="
400 PRINT "%"
```

Example 2. Using an NEC printer without translation

```
10 PRINT "Q"
20 PRINT "W"
30 PRINT "E"
40 PRINT "R"
50 PRINT "T"
60 PRINT "Y"
70 PRINT "U"
80 PRINT "I"
90 PRINT "O"
100 PRINT "P"
110 PRINT "A"
120 PRINT "S"
130 PRINT "D"
140 PRINT "F"
150 PRINT "G"
160 PRINT "H"
170 PRINT "J"
180 PRINT "K"
190 PRINT "L"
200 PRINT "Z"
210 PRINT "X"
220 PRINT "C"
230 PRINT "V"
240 PRINT "B"
250 PRINT "N"
260 PRINT "M"
270 PRINT "1"
280 PRINT "2"
290 PRINT "3"
300 PRINT "4"
310 PRINT "5"
320 PRINT "6"
330 PRINT "7"
340 PRINT "8"
350 PRINT "9"
360 PRINT "0"
370 PRINT "+"
380 PRINT "-"
390 PRINT "="
400 PRINT "%"
```

EXAMPLEX

```
10 PRINT "[CLR/HOME]"
20 PRINT "[HOME]"
30 PRINT "[CRSR U]"
40 PRINT "[CRSR D]"
50 PRINT "[CRSR L]"
60 PRINT "[CRSR R]"
70 PRINT "Q W E R T Y U I O P @ * [CHR$(94)]"
80 PRINT "[CHR$(209)] [CHR$(215)] [CHR$(197)] [CHR$(210)] [CHR$(212)] [CHR$(217)]"
90 PRINT "[CHR$(213)] [CHR$(201)] [CHR$(207)] [CHR$(208)] [CHR$(186)] [CHR$(192)] [PI]"
100 PRINT "A S D F G H J K L : ; ="
110 PRINT "[CHR$(193)] [CHR$(211)] [CHR$(196)] [CHR$(198)] [CHR$(199)] [CHR$(200)]"
120 PRINT "[CHR$(202)] [CHR$(203)] [CHR$(204)] [ ] ="
130 PRINT "Z X C V B N M , . /"
140 PRINT "[CHR$(218)] [CHR$(216)] [CHR$(195)] [CHR$(214)] [CHR$(194)] [CHR$(206)]"
150 PRINT "[CHR$(205)] < > ?"
160 PRINT "1 2 3 4 5 6 7 8 9 0 + - %"
170 PRINT "! "##%&'()0"
```

Example 3. Using an NEC printer with Any Printer/64

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the "before and after" effects of Any Printer/64. Example one is a short listing as it would appear on a Commodore printer using Commodore graphics, without a translation program. Example two shows the same listing using a NEC printer, also *without* using a translation program. Note the missing code in lines 10-60. Lines 20 and 30 were dropped entirely.

Example three is still the same listing as examples one and two, but this time using Any Printer/64. All the lines are now listed. Note how the reverse heart symbol is replaced with English: [CLR/HOME].

Symbols throughout example three are translated to their CHR\$() equivalents. But look at line 80. It says a shifted "Q" is equal to CHR\$(209). However, if you look up the solid ball symbol (shifted "Q") in your user's manual, it says a solid ball is CHR\$(113). Is something wrong? Not really. If you print either CHR\$(113) or CHR\$(209), it will appear as the same solid ball on your screen. But it is stored on the disk as 209, not 113.

Example listing four is a short program which will read a file or pro-

Example two shows the same listing using a NEC printer, note the missing code in lines 10-60.

gram from the disk and print it using ASC values, byte by byte. You can use example four to translate any program, in order to prove that what I said above is true. Example five shows how our original example listing looks when translated using the program in example four.

If you wish, you can convert the large CHR\$() numbers to their smaller equivalents by subtracting 96 from CHR\$() numbers between 192-223 and subtracting 64 from numbers between 224-254. Because the disk stores information using the larger ASC values, Any Printer/64 translates the file unchanged.

If you run the short program in example four, you will see only num-

bers. Every 153 you see stands for the BASIC command PRINT. The 32's mean SPACE. Any 160's are shifted SPACE, and so on.

If you are curious about how the 64 stores BASIC commands like PRINT, POKE, SAVE, and so forth, try this:

Turn your computer off and then back on. Type 10 REM. After the BASIC command REM, type the shifted "Q" symbol. Press RETURN. Now list line 10. Look, the shifted "Q" has changed to INPUT.

So the number 209 means two different things to the 64. If it appears within quotes, it means the symbol for shifted "Q". If it is outside quotes, it is interpreted as the BASIC command INPUT.

If you studied example three, you also noticed that Any Printer/64 did not translate the English pound symbol in line 94 properly. The pound symbol is coded between the bracket symbols in Commodore graphics. Rather than slow the program down decoding a rarely used symbol, I simply accept my printer's translation, knowing from now on that any time I see that symbol as it is displayed in line 94, it means the English pound sign. The English pound symbol has appeared in no programs I have used Any Printer/64 to translate. I don't think this omission will cause you any problems.

Please note that if you use the skip option in Any Printer/64, you should ignore any code that prints out before the first line number. Your skip may cause the program to begin in the middle of a line, preventing Any Printer/64 from knowing if the code it is translating is within quotes or not. Once Any Printer/64 translates a line

Example 4. Listing to examine any file byte by byte

```
1 REM **** EXAMINE ANY FILE ***
2 OPEN 1,4
10 INPUT "FILE NAME";F$
20 INPUT "FILE TYPE";T$
30 T$=LEFT$(T$,1)
40 IF T$<>"S" THEN IF T$<>"P" THEN IF T$<>"U" THEN 20
45 OPEN 15,8,15
50 OPEN 5,8,5,"0:"+F$+"", "+T$+", "R"
60 GOSUB 200
70 GET#5,A$
80 IF T$<>"S" THEN PRINT ST:PRINT#1:CLOSE 1:CLOSE 5:END
90 PRINT#1,ASC(A$+CHR$(0));
100 GOTO 70
200 INPUT#15,A$,B$,C$,D$
210 IF VAL(A$)>0 THEN PRINT A$,B$,C$;D$:STOP
220 RETURN
```

Example 5. Original program translated using listing in example 4

```
1 8 11 8 10 0 153 32 34 147 34 0 21 8 20 0 153 32 34 19 34
0 31 8 30 0 153 32 34 145 34 0 41 8 40 0 153 32 34 17 34 0
51 8 50 0 153 32 34 157 34 0 61 8 60 0 153 32 34 29 34 0 95
8 70 0 153 32 34 81 32 87 32 69 32 82 32 84 32 89 32 85 32
73 32 79 32 80 32 64 32 42 32 94 34 0 129 8 80 0 153 32 34
209 160 215 160 197 160 210 160 212 160 217 160 213 160 201 160
207 160 208 160 186 160 192 160 255 34 0 161 8 90 0 153 32 34
65 32 83 32 68 32 70 32 71 32 72 32 74 32 75 32 76 32 58 32
59 32 61 34 0 193 8 91 0 153 32 34 193 160 211 160 196 160 198
160 199 160 200 160 202 160 203 160 204 160 91 160 93 160 61 3
4 0 221 8 92 0 153 32 34 90 32 88 32 67 32 86 32 66 32 78 32
77 32 44 32 46 32 47 34 0 249 8 93 0 153 32 34 218 160 216
160 195 160 214 160 194 160 206 160 205 160 60 160 62 160 63 34
0 27 9 94 0 153 32 34 49 160 50 160 51 160 52 160 53 160 54
160 55 160 56 160 57 160 48 32 43 32 45 32 92 34 0 47 9 95 0
153 32 34 33 32 34 35 36 37 38 39 40 41 48 34 0 0
```


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number, however, it knows where it's at and everything after that will be translated correctly.

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Line-by-Line Explanation

Line	What it Does				
0-20	Title and defines some code. Be sure to leave 26 spaces between the quotes in line 16.	700-722	View Disk Directory or Not.	880	Translate two bytes to line number and prints.
22	Jumps past the subroutines to the main program.	730-732	Dumps file name (NFS) then gets new name.	890	Begins getting code past line number.
25-47	Displays disk directory. This is a block subroutine, which you can transplant to your own programs, if you wish.	740-742	Checks for SEQ or PRG file.	891	Break: looks for F1 key.
		750-756	Display on screen or printer?	892	Looks for new line number or end of file.
50	Places the cursor on line 18.	760	SK = The number of bytes to skip.	893-896	Checks status.
60	Checks the disk error channel for problems.	800-845	Clears screen. Search screen.		0 = more data to come.
200-240	Translates special graphic codes to English if they are between quotes.	850	Open file to translate.	900	64 = end of file.
			NFS = Name of file	901-904	Looks for quotes (34).
			FTS = File type (S or P)	1000-1040	Prints information.
		855	Opens file to either screen or printer.	1015-1030	End on an error or end of file.
		856	Prints name of file.		Allows you to translate until you decide to stop.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program."

Any Printer/64

```

1 PRINT CHR$(147)CHR$(5):POKE 53281,0
:FOR X=0 TO 5:PRINT:NEXT JWNJ
2 PRINT TAB(13)"ANY PRINTER/64" CDEF
3 PRINT:PRINT TAB(17)"*1984*":PRINT
:PRINT TAB(13)"GARY V. FIELDS" GJUL
4 FOR X=0 TO 3000:NEXT EHVF
15 CLR:OPEN 15,8,15 CIIE
16 US=CHR$(145):RT$=CHR$(18)
:LS$="[SPACE26]" FTDO
17 RO$=CHR$(146):WT$=CHR$(5)
:RD$=CHR$(28):NS=CHR$(0) IEAQ
20 POKE 53280,0 BHTY
22 GOTO 700 BDGB
25 PRINT RT$RD$ "DISK DISPLAY" WT$ BJMJ
26 PRINT:CLOSE 1,8,0:OPEN 1,8,0,"$0"
:A=0:GOSUB 60 FTHL
27 IF D2$<>"OK" THEN CLOSE 1 FEGJ
28 GET#1,A$,A$ BIXI
29 FS$="":B=0:GET#1,A$,A$ DOCL
31 IF A$="" THEN CLOSE 1
:PRINT RT$ [SPACE4] END DIRECTORY
[SPACE3] WT$ FKEK
32 IF A$="" THEN FOR X=0 TO 14-A
:PRINT LS$:NEXT X:GOSUB 50
:RETURN LRAL
34 GET#1,A$ BFIE
35 IF A$="" THEN A=A+1:GOTO 40 GIBJ
36 IF A$=CHR$(34) THEN B=1:A$="" GLLL
37 IF B=1 THEN FS$=FS$+A$ FIKK
38 IF LEN(FS$)>19 THEN PRINT FS
:GOTO 29 GLBM
39 GOTO 34 BCOI
40 IF A<14 THEN 29 DFUC
41 PRINT RT$ "FILE FOUND? [SPACE2]
(Y/N) " WT$:POKE 198,0 CMCJ
42 GET QS:IF QS="" THEN 42 EHPC
43 PRINT US$:PRINT LS$ CIHG
44 IF QS="Y" THEN AS$="":GOTO 31 FHPI
45 PRINT US$:PRINT LS$CHR$(19):PRINT
:PRINT:PRINT:A=0:GOTO 29 IVQO
50 PRINT CHR$(19):FOR X=0 TO 17:PRINT
:NEXT:RETURN IMOI
60 INPUT#15,D1,D2$,D3,D4:RETURN CQUG
200 IF A=32 THEN AS$="":RETURN FGLA
201 IF A=17 THEN AS$="[CRSR D]"
:RETURN FGAD
202 IF A=29 THEN AS$="[CRSR R]"
:RETURN FGRE
203 IF A=145 THEN AS$="[CRSR U]"
:RETURN FHMG
204 IF A=147 THEN AS$="[CLR/HOME]"
:RETURN FHEH
205 IF A=157 THEN AS$="[CRSR L]"
:RETURN FHGI
206 IF A=19 THEN AS$="[HOME]"
:RETURN FGJI
207 IF FT$="S" AND A=13 THEN PRINT#1
:RETURN HIPJ
208 IF A=13 THEN AS$="[RETURN]"
:RETURN FGIL
209 IF A=14 THEN AS$="[LOWER CASE]"
:RETURN FGPM
210 IF A=5 THEN AS$="[WHITE]"
:RETURN FFUD
211 IF A=18 THEN AS$="[REV ON]"
:RETURN FGNE
212 IF A=20 THEN AS$="[DEL]"

```


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```

:RETURN'FGWE
213 IF A=28 THEN A$="[RED]"
:RETURN'FGGG
214 IF A=30 THEN A$="[GREEN]"
:RETURN'FGAH
215 IF A=31 THEN A$="[BLUE]"
:RETURN'FGCI
216 IF A=141 THEN A$="[SHFT RETURN]"
:RETURN'FHV L
217 IF A=142 THEN A$="[UPPER CASE]"
:RETURN'FHMM
218 IF A=144 THEN A$="[BLACK]"
:RETURN'FHJL
219 IF A=146 THEN A$="[REV OFF]"
:RETURN'FHUN
220 IF A=148 THEN A$="[INST]"
:RETURN'FHGE
221 IF A=156 THEN A$="[PUR]"
:RETURN'FHIF
222 IF A=158 THEN A$="[YEL]"
:RETURN'FHWG
223 IF A=159 THEN A$="[CYN]"
:RETURN'FHXH
224 IF A=255 THEN A$="[PI]"
:RETURN'FHTH
225 IF A=133 THEN A$="[F1]"
:RETURN'FHFI
226 IF A=134 THEN A$="[F3]"
:RETURN'FHIF
227 IF A=135 THEN A$="[F5]"
:RETURN'FHLK
228 IF A=136 THEN A$="[F7]"
:RETURN'FHOL
229 IF A=137 THEN A$="[F2]"
:RETURN'FHKM
230 IF A=138 THEN A$="[F4]"
:RETURN'FHNE
231 IF A=139 THEN A$="[F6]"
:RETURN'FHQF
232 IF A=140 THEN A$="[F8]"
:RETURN'FHKG
233 IF A=160 THEN A$=" ":RETURN'FHLG
234 IF A=151 THEN A$="[GREY 1]"
:RETURN'FHAJ
235 IF A=152 THEN A$="[GREY 2]"
:RETURN'FHCK
236 IF A=155 THEN A$="[GREY 3]"
:RETURN'FHGL
237 IF A=129 THEN A$="[ORANGE]"
:RETURN'FHCN
238 IF A=150 THEN A$="[LT RED]"
:RETURN'FHSN
239 IF A=153 THEN A$="[LT GREEN]"
:RETURN'FHRP
240 IF A=154 THEN A$="[LT BLUE]"
:RETURN'FHTH
241 IF A=149 THEN A$="[BROWN]"
:RETURN'FHHH
250 X$=STR$(A):X$=MID$(X$,2,3)
:A$="[CHR$("+X$+")]":RETURN'IWIN
300 IF A=153 THEN A$="PRINT"
:RETURN'FHVD
301 IF A=151 THEN A$="POKE"

:RETURN'FHFD
302 IF A=152 THEN A$="PRINT#"
:RETURN'FHGF
303 IF A=129 THEN A$="FOR":RETURN'FHMF
304 IF A=131 THEN A$="DATA"
:RETURN'FHHG
305 IF A=137 THEN A$="GOTO"
:RETURN'FHTH
306 IF A=139 THEN A$="IF":RETURN'FHYI
307 IF A=141 THEN A$="GOSUB"
:RETURN'FHFK
308 IF A=142 THEN A$="RETURN"
:RETURN'FHDL
309 IF A=163 THEN A$="TAB("
:RETURN'FHKL
310 IF A=164 THEN A$="TO":RETURN'FHRD
311 IF A=175 THEN A$="AND":RETURN'FHSE
312 IF A=176 THEN A$="OR":RETURN'FHSE
313 IF A=199 THEN A$="CHR$"
:RETURN'FHVG
314 IF A=140 THEN A$="RESTORE"
:RETURN'FHUI
315 IF A=170 THEN A$="+":RETURN'FHYH
316 IF A=171 THEN A$="-":RETURN'FHCI
317 IF A=172 THEN A$="*":RETURN'FHAJ
318 IF A=173 THEN A$="/":RETURN'FHGK
319 IF A=174 THEN A$="[^]":RETURN'FHEL
320 IF A=177 THEN A$=">":RETURN'FHAD
321 IF A=178 THEN A$="=":RETURN'FHA E
322 IF A=179 THEN A$="<":RETURN'FHA F
323 IF A=194 THEN A$="PEEK"
:RETURN'FHCH
324 IF A=167 THEN A$="THEN"
:RETURN'FHMI
325 IF A=133 THEN A$="INPUT"
:RETURN'FHWK
326 IF A=132 THEN A$="INPUT#"
:RETURN'FHHL
327 IF A=143 THEN A$="REM":RETURN'FHFL
328 IF A=159 THEN A$="OPEN"
:RETURN'FHQM
329 IF A=160 THEN A$="CLOSE"
:RETURN'FHWO
330 IF A=169 THEN A$="STEP"
:RETURN'FHCF
331 IF A=201 THEN A$="RIGHT$"
:RETURN'FHHM
332 IF A=147 THEN A$="LOAD"
:RETURN'FHUH
333 IF A=203 THEN A$="GO":RETURN'FHXI
340 IF A=128 THEN A$="END":RETURN'FHUG
341 IF A=130 THEN A$="NEXT"
:RETURN'FHSH
342 IF A=134 THEN A$="DIM":RETURN'FHUI
343 IF A=135 THEN A$="READ"
:RETURN'FHNJ
345 IF A=138 THEN A$="RUN":RETURN'FHBL
346 IF A=144 THEN A$="STOP"
:RETURN'FHFM
347 IF A=145 THEN A$="ON":RETURN'FHKN
348 IF A=148 THEN A$="SAVE"
:RETURN'FHLO
349 IF A=149 THEN A$="VERIFY"

```


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```

:RETURN'FHYQ
350 IF A=150 THEN A$="DEF":RETURN'FHHH
351 IF A=154 THEN A$="CONT"
:RETURN'FHNI
352 IF A=155 THEN A$="LIST"
:RETURN'FHWJ
353 IF A=156 THEN A$="CLR":RETURN'FHGK
354 IF A=157 THEN A$="CMD":RETURN'FHTL
355 IF A=197 THEN A$="VAL":RETURN'FHNH
356 IF A=161 THEN A$="GET":RETURN'FHBH
357 IF A=165 THEN A$="FN":RETURN'FHDO
358 IF A=166 THEN A$="PC("
:RETURN'FHDH
359 IF A=168 THEN A$="NOT":RETURN'FHAQ
360 IF A=180 THEN A$="SGN":RETURN'FHKI
361 IF A=181 THEN A$="INT":RETURN'FHOJ
362 IF A=182 THEN A$="ABS":RETURN'FHTK
363 IF A=183 THEN A$="USR":RETURN'FHGL
364 IF A=184 THEN A$="FRE":RETURN'FHDM
365 IF A=185 THEN A$="POS":RETURN'FHAN
366 IF A=186 THEN A$="SQR":RETURN'FHFO
367 IF A=187 THEN A$="RND":RETURN'FHNH
368 IF A=188 THEN A$="LOC":RETURN'FHMJ
369 IF A=189 THEN A$="EXP":RETURN'FHYR
370 IF A=190 THEN A$="COS":RETURN'FHIJ
371 IF A=191 THEN A$="SIN":RETURN'FHOK
372 IF A=192 THEN A$="TAN":RETURN'FHIL
373 IF A=193 THEN A$="ATN":RETURN'FHJM
374 IF A=195 THEN A$="LEN":RETURN'FHHN
375 IF A=196 THEN A$="STR$"
:RETURN'FHVO
376 IF A=158 THEN A$="SYS":RETURN'FHNH
377 IF A=198 THEN A$="ASC":RETURN'FHCQ
378 IF A=200 THEN A$="LEFT$"
:RETURN'FHIR
379 IF A=202 THEN A$="MID$"
:RETURN'FHDS
380 IF A=146 THEN A$="WAIT"
:RETURN'FHPK
381 IF A=162 THEN A$="NEW":RETURN'FHML
382 IF A=136 THEN A$="LET":RETURN'FHIM
383 IF A=255 THEN A$="[PI]"
:RETURN'FHTN
390 X$=STR$(A):X$=MID$(X$,2,3)
:A$="CHR$("+X$+")":RETURN'IWDR
700 PRINT CHR$(147):PRINT:PRINT
:PRINT'FIWF
710 PRINT:PRINT'CBHD
720 DD$="":INPUT"VIEW THE DISK
DIRECORY (Y/N)";DD$'CIGN
722 IF DD$="Y"THEN PRINT CHR$(147)
:GOSUB 25:A=0'HOSM
730 NF$="":INPUT"NAME FILE";NF$'CIHJ
732 IF LEN(NF$)<1 OR LEN(NF$)>16 THEN
PRINT U$U$:GOTO 730'JVSQ
740 FT$="":PRINT"FILE TYPE
: "RT$"P"RO$"RG OR "RT$"S"RO$"EQ";
:INPUT FT$'DVJR
742 IF FT$<>"P"THEN IF FT$<>"S"THEN
PRINT U$U$:GOTO 740'KODR
750 FD$="":PRINT"PRINT TO
"RT$"S"RO$"CREEN OR
"RT$"P"RO$"RINTER";:INPUT FD$'DVRU
752 IF FD$<>"S"THEN IF FD$<>"P"THEN
PRINT U$U$:GOTO 750'KOXS
754 IF FD$="S"THEN FD=3'EGJO
756 IF FD$="P"THEN FD=4'EGHQ
760 SK=0:PRINT"# BYTES TO SKIP
"RT$"<RETURN>"RO$" = NONE"
:INPUT SK'DNXU
800 PRINT CHR$(147):FOR X=0 TO 4
:PRINT'GKLH
810 PRINT RT$" SEARCHING FOR
:[SPACE2]"NF$" ,"FT$'BJDK
830 IF FD=3 THEN TY$="SCREEN"'EGIK
835 IF FD=4 THEN TY$="PRINTER"'EGEQ
840 PRINT TAB(3)"DISPLAY ON: "TY$'CFJL
845 PRINT TAB(5)RT$" < F1 TO ABORT>
"'CFBR
850 CLOSE 8:OPEN 8,8,8,"0
: "+NF$+", "+FT$+",R"'GOUP
852 IF SK>0 THEN FOR X=0 TO SK
:GET#8,A$:NEXT:X=0'JROS
855 CLOSE 1:OPEN 1,FD'CGTO
856 PRINT#1,NF$'BFWO
860 GOSUB 60:IF A>0 THEN PRINT
CHR$(147)D1;D2$,D3;D4
:GOTO 1000'HCQR
865 IF FT$="P"THEN GET#8,A$,B$'ELSS
870 IF FT$="P"THEN GET#8,A$,B$'ELSO
874 IF FT$="S"THEN 905'DGWQ
875 GET#8,C$,D$:F1=ASC(C$+N$)
:F2=ASC(D$+N$)'HBFY
880 IF ST=0 THEN PRINT#1,(F2*256)+F1;
'GPER
890 GET#8,A$:A=ASC(A$+N$)
:IF A>0 THEN C=0'ISFU
891 GET BK$:IF BK$=CHR$(133)THEN GOTO
1000'GQAT
892 IF A=0 THEN FL=0:PRINT#1:C=C+1
:GOTO 870'IPWV
893 IF ST=0 THEN 900'DGIR
895 IF ST=64 THEN 1000'DIGT
896 PRINT"STATUS: "ST:GOTO 1000'CHJW
900 IF FL=0 AND A=34 THEN FL=1
:GOTO 905'HNHK
901 IF FL=1 AND A>93 THEN GOSUB 200
:GOTO 910'HNWL
902 IF A=34 THEN FL=0'EGAJ
903 IF A<33 THEN GOSUB 200
:GOTO 910'FKIL
904 IF A>93 THEN GOSUB 300
:GOTO 910'FKNM
905 PRINT#1,CHR$(A);:A=0:GOTO 890'ENXN
910 PRINT#1,A$;:GOTO 890'CJXG
1000 PRINT#1:GOSUB 60'CEUT
1001 PRINT CHR$(5):CLOSE 1:CLOSE 8
:CLOSE 15'FKQY
1010 IF D1>0 THEN PRINT"ERROR-"EDVX
1011 PRINT"DISK STATUS:"D1;D2$,D3;
D4'BMWB
1015 PRINT:PRINT"DO YOU WISH TO TRY
AGAIN <Y/N>?"'CBKI
1020 GET Q$:IF Q$=""THEN 1020'EJHY
1030 IF Q$="Y"THEN CLR:GOTO 15'FFTA
1040 END'BACW

```

END

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\$139⁹⁵

- C128 Disks 79¢ ea.*
- Paperback Writer 64 \$34.95
- 10" Comstar 10X Printer \$148.00
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Paperback Dictionary	\$24.95	\$14.95	\$10.00
The Print Shop	\$44.95	\$27.95	\$26.95
Halley's Project	\$39.95	\$25.95	\$24.95
Practicalc (spread sheet)	\$59.95	\$19.95	\$14.95
Programmers Reference Guide	\$24.95	\$16.95	\$12.50
Nine Princes in Amber	\$32.95	\$24.95	\$21.95
Super Bowl Sunday	\$30.00	\$19.95	\$17.95
Flip & File Disk Filer	\$24.95	\$14.95	\$12.95
Deluxe Tape Cassette (plus FREE game)	\$89.00	\$44.95	\$34.95
Pra Joystick	\$19.95	\$12.95	\$10.00
Computer Care Kit	\$44.95	\$29.95	\$24.95
Dust Cover	\$ 8.95	\$ 6.95	\$ 4.60
Injured Engine	\$39.95	\$27.95	\$24.95
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Musical Calc	\$59.95	\$14.95	\$12.95
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**Plus FREE \$69.95 Timeworks
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- 340K 1571 Disk Drive \$259.00
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- 60% of all drive downtime is directly related to poorly maintained drives.
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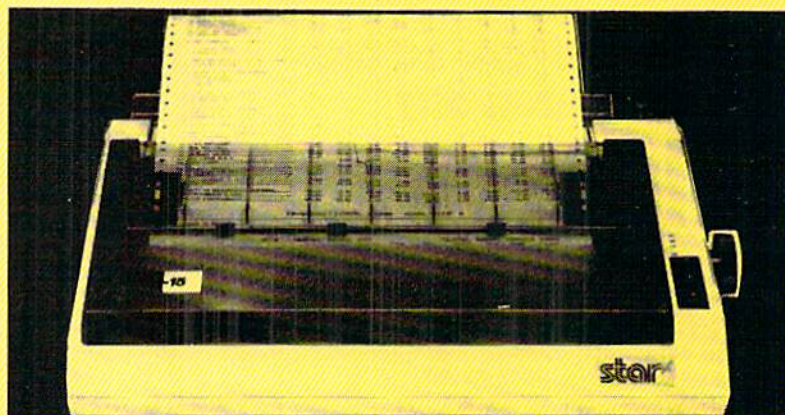
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(IBM — Commodore)

COMSTAR 15 1/2 X SPECIFICATIONS

(Apple — Atari — Etc.)

Print Size

10, 12, 17, 5, 6, 8.5 CPI

Number of Columns

136, 164, 232 (68, 82, 116 Double Width)

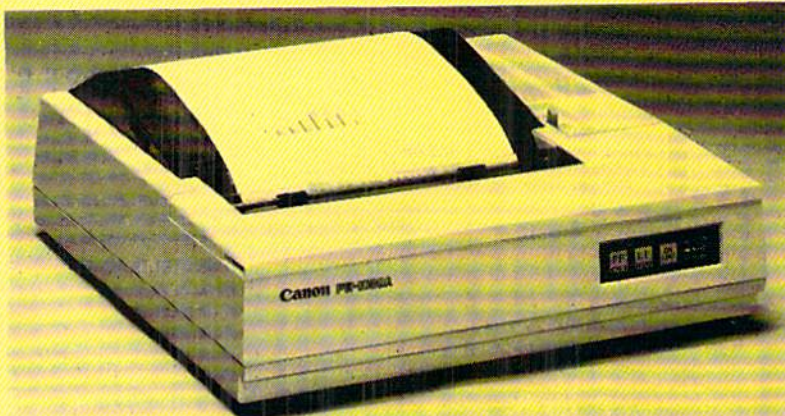
Character Fonts

Normal (10 CPI); Elite (12 CPI); Condensed (17 CPI); Enlarged (5, 6, 8.5 CPI); Emphasized; Double Strike; Super & Sub Script

Character Sets

96 Standard ASCII, 32 Block Graphic, 96 Italics Characters

Cartridge Ribbon. List \$6.95. Sale \$4.95.



15" Printers use 10" and 15" Paper

CANON 15" Printer \$259⁰⁰

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160 CPS + Letter Quality Mode

• Programmable Characters
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CANON SPECIFICATIONS

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Printing Method

Impact dot matrix

Printing Speed

160 CPS at standard character printing
27 CPS at NLQ character printing

Printing Characters

Standard 11 x 9 dot matrix
NLQ 23 x 18 dot matrix

Character set: Full ASCII character set (96),
32 special European characters

Print Buffer

2K-byte utility buffer

Image Printing

Horizontal 120 dots/inch (double density)
Horizontal 240 dots/inch (quadruple density)

Interface

8-bit parallel interface (Centronics type)

Paper

Plain paper, Roll paper, Single sheet,
Fanfold, Multipart paper: max. 3 sheets

Ink Ribbon Cartridge — Sale \$14.95

Ribbon Life: 3 million characters/cartridge

Maximum Number of Characters

Standard:	10 cpi	80 cpl
Enlarged:	5 cpi	40 cpl
Condensed:	17.1 cpi	136 cpl
Condensed enlarged:	8.5 cpi	68 cpl
Elite:	12 cpi	96 cpl
Elite enlarged:	6 cpi	48 cpl
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Interfaces

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Apple \$59.00

Atari \$59.00

Commodore \$39.00

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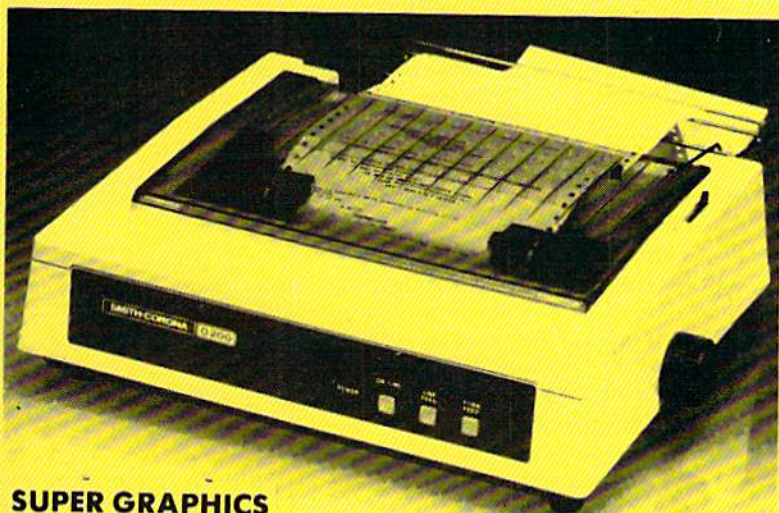
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- Friction Feed/Tractor Feed — Standard
- 80 character print line at 10 CPI
- 1 Line Buffer, 2K Buffer on 120/160 CPS Plus LQM
- Six pitches
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- Centronics compatible parallel interface
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italic print. There is standard data processing quality print

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\$429.00

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(IBM — Commodore)

SPECIFICATIONS

(Apple — Atari — Etc.)

Size/Weight

Height 5.04" Width 16.7"
Depth 13.4" Weight 18.7 lbs.

Internal Char. Coding

ASCII Plus ISO

Print Buffer Size

120 CPS: 132 Bytes (1 line)
120/160 CPS Plus LQM: 2K

No. of Char. In Char. Set

96 ASCII Plus International

Graphics Capability

Standard 60, 72, 120 DPI
Horizontal 72 DPI Vertical

Pitch

10, 12, 16.7, 5, 6, 8.3, Proportional Spacing

Printing Method

Impact Dot Matrix

Char. Matrix Size

9H x 9V (Standard) to 10H x 9V
(Emphasized & Elongate)

Printing Features

Bi-directional, Short line seeking, Vertical
Tabs, Horizontal Tabs

Forms Type

Fanfold, Cut Sheet, Roll (optional)

Max Paper Width

11"

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Ribbon

Cassette — Fabric inked ribbon

Ribbon Life

4 million characters

Interfaces

Parallel 8 bit Centronics compatible
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Character Mode

10 x 8 Emphasized; 9 x 8 Standard; 10 x 8
Elongated; 9 x 8 Super/Sub Script (1 pass)

Character Set

96 ASCII

11 x 7 International Char.

Line Spacing

6/8/12/72/144 LPI

Character Spacing

10 cpi normal; 5 cpi elongated normal; 12 cpi
compressed; 6 cpi elongated compressed;
16.7 cpi condensed; 8.3 cpi elongated
condensed; 5.125 cpi elongated proportional

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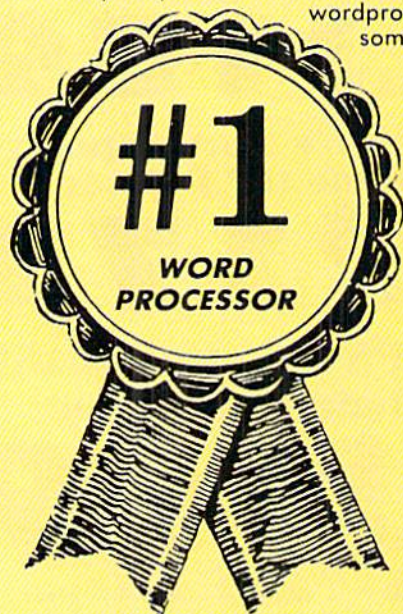
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40 or 80 Columns
in Color

Paperback Writer 64

40 or 80 Columns
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This is the easiest to use and most powerful word processor available for the Commodore 64. As you type on the screen, you will see your letters and words appear on the screen exactly as they will be printed (i.e. Italics will be *Italic*, Bold Face will be **Bold Face**). With the printer files you can customize Paperback Writer 64 to use all the fancy features of your printer. Loads EZ Script®, Paperclip®, & Wordpro 64® Files so you can easily upgrade your past wordprocessing text that you've written with obsolete wordprocessors. Take a look at some of the other features:



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- **Flexible Cursor Movement**, Including Tabs And Other Timesavers.
- **Deletion And Insertion** Of Characters, Lines And Blocks Of Text.
- **On-screen Text Enhancement**, Such As Bold Face, Italics, Underlining, Superscripts And Subscripts, And Foreign And Other Characters.
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- **Sorting Lists** In Order Of Numbers And Letters.
- **Aligning And Adding Numbers** In Columns, Helpful With Tables.
- **Variable Margins** At Left And Right, And Paragraph Indentation.
- **Lines Centered, Justified Or Aligned** At The Right Side.
- **Variable Page Lengths And Line Spacing.**
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- **Find And Replace** Text Functions That Can Be Automatic.
- Complete Or Selective **Directories** Of Files On The Disk.
- **Sequential Files** For Mail Lists And Communication With Other Computers.
- **Spelling Checker**, Checks Your Spelling.

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SALE PRICE

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Full help screens on line with additional help on the disks mean you don't even need a manual. If you're in the middle of a page and you want to know how to use a special function just hit F7 and the information will appear before your eyes. If you still don't understand hit F7 again and a more detailed explanation appears. Then simply hit F8 and you're back in the letter where you left off. No manual lookup necessary. This is the easiest word processor in the world to use. List \$99.00.

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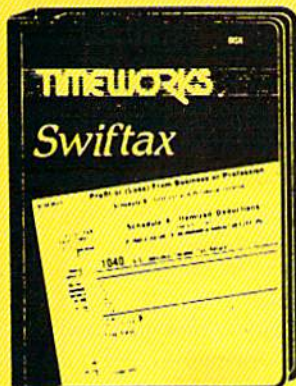
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Personal Library Manager

A Filing System for Document Abstracts for the Commodore 64

Personal Library Manager is a menu-driven program designed to easily store, update, and retrieve abstract information on your favorite *Commodore Microcomputers* magazine articles. Instead of searching through piles of magazines to find a favorite article, just use this program to enter the name, author or key information of an article you are searching for, and it will return to you the magazine title, publication date, author and full abstract information on the article. The program:

- Is completely MENU and FORM driven.
- Has a HELP feature to answer operational questions.
- Has an ADD abstract function and a DELETE abstract function.
- Has a RETRIEVE abstract function, composed of:
 - Retrieve by abstract keyword
 - Retrieve by abstract title
 - Retrieve by author
 - Retrieve by abstract title and author
 - Retrieve all abstracts
- Allows you to VIEW on the monitor or PRINT on the printer.
- Provides fast access to abstracts through the use of disk storage for up to 250 abstracts per file set.
- Requires no expensive data management or advanced programming software. The program uses the Commodore ROM BASIC only!

After you enter and save the program, run it by typing LOAD "LIB-MAN",8. At this point, the main menu comes up. From here, you will want



to type "H" to read the HELP information. After that, return to the main menu by typing "Q" and type "U" to go to the update selection menu. Here you can "A"dd or "D"elete abstracts. In either of these menu/forms, you can enter data into the variable fields.

While entering data, notice that pressing RETURN (the tab-forward function for this program) always enters a space into the current cursor location and moves the cursor forward to the first position of the next variable field. When RETURN is pressed in the action field, all variable fields on the screen are cleared and the cursor is repositioned at the first variable field. Also, the user is notified that the data should be re-entered. Finally, pressing the DEL key deletes the last character entered.

To retrieve abstracts stored in your data base, type "R". Then enter an asterisk in the author field. This will display all the authors and their related information. From here, you can retrieve individual abstracts by abstract keyword, title or author. You can choose to either "P"rint or "V"iew them.

There are some interesting techniques used in this program that are useful to beginning programmers as learning tools or as routines that can be inserted into their own programs. These techniques include:

- A keyboard-read routine coded entirely in BASIC.
- A menu or form capability, plus data-entry forms that contain variable and fixed-field information. These methods are similar to those used on much larger computers. The forms are controlled by another BASIC routine, driven by a form table, which can be easily adapted to any new form.
- Routines to print error messages (disk, mostly) at the top of the form without destroying the form on the screen. Again, remember that all of these routines are quite straightforward, and can be easily adapted to any other BASIC program on the Commodore 64.
- String garbage collection at the end of every major function in order to keep the string storage cleaned up and improve program performance.
- Use of relative files to store the abstract information, with a sequential file used as the index or pointer file into the relative file. The program knows whether or not the files exist at run time and creates them on the fly if they do not.
- Use of subroutines, reducing the amount of inline repetitive code.

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- And finally, heavy annotation, making it easy for someone to quickly find the code they are interested in, learn how the program works, or make personal changes to it.

Notice also that this program can be

used to store data other than document abstracts. For instance, the author field can contain any information which then becomes the "key" into the relative file data base. The other files can contain any information you wish to have accessed or indexed by

the key data.

Personal Library Manager is an efficient, adaptable, and easy-to-use fast-access database program, which at the same time can serve as an excellent learning tool for beginning programmers.

C

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program."

Library Manager

```

220 DIM K1$(3) : REM KEYWORD TABLE'CTAE
250 DIM S3(75) : REM SCREEN VARIABLE
    FIELD TABLE'CGYK
280 DIM AH$(500) : REM AUTHOR
    TABLE'CUDK
310 REM'BARX
340 REM LOAD SCREEN MATRIX'S'BSOG
370 REM'BARE
400 READ A : REM FIGURE OUT HOW MANY
    SCREEN TABLES'CFHH
430 FOR M = 0 TO A-1 : I=M*25
    : READ S3(I)'HPFI
460 FOR P = 1 TO S3(I) : READ S3(P+I)
    : NEXT P'GQTL
490 NEXT M'BBGH
520 AT = 0 : REM PRIME FOR ONE TIME
    AUTHOR TABLE LOAD'CJQM
550 P1$="2":P2$="1":Z$=","'DKDI
580 GOTO 1870'BENI
610 REM'BARB
640 REM FIELD FILLING SUBROUTINE'BWIL
670 REM'BARH
700 BT=0:C1=1:R1=0:B$=""
    : REM INITIALIZE BACK TAB,
    ROW/COLUMN AND BUFFER'FCYS
730 GOSUB 1300 : REM TAB TO NEXT
    FIELD'CTEK
760 GOSUB 1540 : REM READ A
    CHARACTER'CTKN
790 IF A$=CHR$(13) THEN B$=B$+" "
    :GOTO 1180'HPDR
820 IF A$<> CHR$(20) THEN GOTO 1000
    : REM CHECK FOR DELETE KEY'HDEP
850 IF (C1=1 AND R1=0) THEN 760
    : REM LEAVE ALONE IF AT FIRST
    POSITION'GOEV
880 B$=LEFT$(B$,LEN(B$)-1)
    : REM SHRINK BUFFER BY ONE'FFGU
910 IF C1=1 THEN R1=R1-1: C1=S3(Q+2)
    :BT=C1-1:GOSUB 1300:GOTO 760'LHLS
940 C1 = C1 - 1 :BT=C1-1
    : REM BACK UP ONE POSITION IF IN
    MIDDLE'FORU
970 GOSUB 1300:GOTO 760
    : DE LET E PREVIOUS EXCEPT AT
    BEGINNING OF FIELD'DTPX
1000 B$ = B$ + A$'CGPU
1030 C1=C1+1 : REM BUMP COL COUNT'DSQC
1060 IF C1<= S3(Q+2) GOTO 760
    : REM CHECK IF END OF
    COLUMNS'GGIK

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1090 R1=R1+1:C1=1:BT=0 : REM YES'FRSJ
1120 IF R1< S3(Q+3) THEN GOSUB 1300
    :GOTO 760 : REM IF NOT LAST ROW
    TAB'HHFI
1150 IF R1 < S3(Q+3) THEN 760
    : REM END OF ROW/FIELD? IF NOT
    READ MORE'FPPM
1180 RETURN'BAQC
1210 REM'BARV
1240 REM TABBING SUBROUTINE'BRYE
1270 REM'BARC
1300 PRINT "[HOME]";'BBFV
1330 PRINT TAB(S3(Q+1)+BT-1);'FLPE
1360 FOR R3 = 1 TO (S3(Q)-1)+R1
    :PRINT "[DOWN]";:NEXT R3'HSKK
1390 PRINT CHR$(18)" [LEFT]";
    :REM SPACE FOR BACK TAB'DVXN
1420 RETURN'BAQY
1450 REM'BARC
1480 REM THE FOLLOWING ARE KEYBOARD
    READ AND CURSOR BLINK
    SUBROUTINES'BCIU
1510 REM'BARY
1540 GET A$:IF A$ = "" THEN GOSUB 1720
    :GOTO 1540'GOII
1570 IF A$=","OR A$=";"OR A$="
    : "THEN A$=" " : REM PURGE INPUT
    DELIMITERS'JECT
1600 IF (A$<" " OR A$>"[BACK ARROW]
    ")AND (A$<> CHR$(13) AND A$<>
    CHR$(20)) THEN A$=" "'OWDN
1630 IF A$<>CHR$(13) AND A$<>CHR$(20)
    THEN PRINT A$;:PS=1'LTWN
1660 IF F<3 AND PS=1 THEN PRINT "
    [LEFT]";:PS=0'HKUM
1690 RETURN'BAQI
1720 PRINT CHR$(146)" [LEFT]";
    :FOR X=1 TO 200:NEXT'GNTJ
1750 PRINT CHR$(18)" [LEFT]";
    :FOR X=1 TO 200:NEXT:RETURN'HNTM
1780 REM'BARI
1810 REM MAIN MENU'BIHE
1840 REM'BARF
1870 F = 1 : REM SET TO FORM ONE'CPAN
1900 POKE 53280,7:POKE 53281,2'CPUG
1930 PRINT "[WHITE]";"[CLEAR]";"[DOWN]
    "'BCJG
1960 PRINT "[SPACE2]WELCOME TO
    PERSONAL LIBRARY MANAGER!"'BAMS
1990 PRINT "[DOWN]"'BATL
2020 PRINT "[SPACE14]DO YOU WANT"'BAHB
2050 PRINT "[DOWN]"'BATY
2080 PRINT "[SPACE15]TO UPDATE"'BAHH
2110 PRINT "[DOWN]"'BATV
2140 PRINT "[SPACE19]OR"'BAFC

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2170 PRINT "[DOWN]"BATC
2200 PRINT "[SPACE10]RETRIEVE
ABSTRACTS?"BALD
2230 PRINT "[DOWN]"BATY
2260 PRINT "[SPACE8]TYPE 'U' -
UPDATE"BATH
2290 PRINT "[SPACE13]'R' -
RETRIEVE"BAIK
2320 PRINT "[SPACE13]'H' - HELP"BAID
2350 PRINT "[SPACE13]'Q' - QUIT"BASG
2380 PRINT "[DOWN]"BATE
2410 PRINT "[SPACE13]-->[ ]<--";"
[LEFT5]";'BCKG
2440 GOSUB 1540'BELD
2470 IF A$ = "Q" THEN SYS 64738'EHSJ
2500 IF A$ = "R" THEN GOSUB 5770'EGBC
2530 IF A$ = "U" THEN GOSUB 2740'EGXF
2560 IF A$ = "H" THEN GOSUB 16300'EHZJ
2590 IF F<> 1 THEN GOTO 1870'FGBM
2620 GOTO 2440'BEHD
2650 REM'BARF
2680 REM THIS IS THE UPDATE FORM'BATIO
2710 REM'BARC
2740 F = 2 : REM SET TO FORM TWO'CPAK
2770 POKE 53280,5:POKE 53281,7'CPXM
2800 PRINT "[BLUE]";"[CLEAR]";"[DOWN2]
""BCCD
2830 PRINT "[SPACE12]DO YOU WANT
TO""BAPK
2860 PRINT "[DOWN]"BATI
2890 PRINT "[SPACE12]ADD OR DELETE
[SPACE2]"BARQ
2920 PRINT "[DOWN]"BATE
2950 PRINT "[SPACE14]ABSTRACTS?"BAWN
2980 PRINT "[DOWN]"BATL
3010 PRINT "[DOWN2]"BALV
3040 PRINT "[SPACE8]TYPE 'A' -
ADD""BACD
3070 PRINT "[SPACE13]'D' -
DELETE""BATG
3100 PRINT "[SPACE13]'Q' - QUIT""BASA
3130 PRINT "[DOWN]"BATY
3160 PRINT "[SPACE13]-->[ ]<--";"
[LEFT5]";'BCKJ
3190 GOSUB 1540'BELG
3220 IF A$ = "Q" THEN RETURN'ECPC
3250 IF A$ = "A" THEN GOSUB 3460'EGDF
3280 IF A$ = "D" THEN GOSUB 4840'EGJI
3310 IF F <> 2 THEN GOTO 2740'FGYD
3340 GOTO 3190'BEKD
3370 REM'BARF
3400 REM THIS IS THE ADD FORM'BQOE
3430 REM'BARC
3460 F = 3 : REM SET TO FORM
THREE'CRVL
3490 POKE 53280,14:POKE 53281,1'CPQM
3520 PRINT "[RED]";"[CLEAR]"BBGD
3550 IF SE=0 THEN GOTO 3610'EHEI
3580 PRINT "[SPACE9,RVS,BLUE]
RE-ENTER ABSTRACT DATA[RVOFF,RED]
":GOTO 3640'CFTS
3610 PRINT "[SPACE12]ADD AN
ABSTRACT""BASI
3640 PRINT "[DOWN2] ABSTRACT TITLE
[SPACE2]- [RVS,SPACE20,RVOFF]
""BATN
3670 PRINT TAB(19)"[RVS,SPACE20,RVOFF]
""CDSM
3700 PRINT "[DOWN] AUTHOR[SPACE10]-
[RVS,SPACE20,RVOFF]"BAKJ
3730 PRINT "[DOWN] DOCUMENT TITLE
[SPACE2]- [RVS,SPACE20,RVOFF]
""BANN
3760 PRINT "[DOWN] ABSTRACT DATE
[SPACE3]- [RVS,SPACE20,RVOFF]
""BAIQ
3790 PRINT "[DOWN] ABSTRACT[SPACE8]-
[RVS,SPACE20,RVOFF]"BACS
3820 PRINT TAB(19)"[RVS,SPACE20,RVOFF]
""CDSJ
3850 PRINT TAB(19)"[RVS,SPACE20,RVOFF]
""CDSM
3880 PRINT TAB(19)"[RVS,SPACE20,RVOFF]
""CDSP
3910 PRINT "[DOWN2,SPACE3]
TYPE 'RETURN' - TAB""BAEK
3940 PRINT "[SPACE13]'P' -
PROCESS""BAJN
3970 PRINT "[SPACE13]'Q' - QUIT""BASP
4000 PRINT "[DOWN,SPACE13]-->[ ]
<--""BAMA
4030 Q=1: REM INITIALIZE FIELD
POINTER'CAPH
4060 GOSUB 700:REM - 1ST FIELD'CNKG
4090 F1$=B$'BFDG
4120 Q=1+(1*4)'DGNC
4150 GOSUB 700:REM - 2ND FIELD'CNPG
4180 F2$=B$'BFEG
4210 Q=1+(2*4)'DGOC
4240 GOSUB 700:REM - 3RD FIELD'CNUG
4270 F3$=B$'BFFG
4300 Q=1+(3*4)'DGPC
4330 GOSUB 700:REM - 4TH FIELD'CNCG
4360 F4$=B$'BFGG
4390 Q=1+(4*4)'DGQL
4420 GOSUB 700:REM - 5TH FIELD'CNDG
4450 F5$=B$'BFHG
4480 Q=1+(5*4)'DGRL
4510 GOSUB 700 : REM - ACTION
FIELD'CQJH
4540 SE=1'BDWG
4570 IF A$=CHR$(13) THEN PRINT
CHR$(146)" ";:GOTO 3520'HRXP
4600 SE=0'BDVD
4630 IF A$ = "P" THEN GOSUB 9460'EGYI
4660 IF A$ = "Q" THEN RETURN'ECPL
4690 IF F<> 3 THEN GOTO 3460'FGAP
4720 GOTO 4480'BENG
4750 REM'BARI
4780 REM THIS IS THE DELETE FORM'BTRR
4810 REM'BARF
4840 F = 5 : REM SET TO FORM FIVE'CQBN
4870 POKE 53280,8:POKE 53281,3'CPWP
4900 PRINT "[RED]";"[CLEAR]"BBGG
4930 PRINT "[DOWN3]"BADI
4960 IF SE=0 THEN GOTO 5020'EHBO

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4990 PRINT "[DOWN,SPACE10,RVS,BLACK]
      RE-ENTER DELETE DATA[RVOFF,RED]"
      :GOTO 5050'CFXY
5020 PRINT "[DOWN,SPACE10]
      DELETE AN ABSTRACT"BAHF
5050 PRINT "[DOWN3]"BADC
5080 PRINT " ABSTRACT TITLE[SPACE2]-
      [RVS,SPACE20,RVOFF]"BAKN
5110 PRINT TAB(19)"[RVS,SPACE20,RVOFF]
      "CDS
5140 PRINT "[DOWN3]"BADC
5170 PRINT "[SPACE4]TYPE 'RETURN' -
      TAB"BACK
5200 PRINT "[SPACE13]'P' -
      PROCESS"BAJE
5230 PRINT "[SPACE13]'Q' - QUIT"BASG
5260 PRINT "[DOWN]"BATF
5290 PRINT "[SPACE13]-->[ ]<--"BAUM
5320 Q=26: REM INITIALIZE FIELD
      POINTER'CBUK
5350 GOSUB 700:REM - 1ST FIELD'CNKJ
5380 F1$=B$'BFDJ
5410 Q=26+(1*4)'DHSF
5440 GOSUB 700 : REM - ACTION
      FIELD'CQJK
5470 SE=1'BDWJ
5500 IF A$=CHR$(13) THEN PRINT
      CHR$(146)" "":GOTO 4900'HRBJ
5530 SE=0'BDVG
5560 IF A$ = "P" THEN GOSUB 14470'EHNH
5590 IF A$ = "Q" THEN RETURN'ECPO
5620 IF F<> 5 THEN GOTO 4840'FGFJ
5650 GOTO 5410'BEHJ
5680 REM'BARL
5710 REM THIS IS THE RETRIEVE
      FORM'BVVL
5740 REM'BARI
5770 F = 6 : REM SET TO FORM SIX'CPXQ
5800 POKE 53280,5:POKE 53281,1'CPRJ
5830 PRINT "[BLUE]";"[CLEAR]";"[DOWN]
      "BCKJ
5860 IF SE=0 THEN GOTO 5920'EHPF
5890 PRINT "[SPACE9,RVS,GREEN]
      RE-ENTER RETRIEVE DATA[RVOFF,
      BLUE]":GOTO 5950'CFUY
5920 PRINT "[SPACE10]RETRIEVE AN
      ABSTRACT"BAFP
5950 PRINT "[DOWN] ENTER ABSTRACT
      TITLE, AUTHOR'S NAME,"BAGV
5980 PRINT " BOTH, OR '*' IN AUTHOR
      FIELD (TO SEE"BAHX
6010 PRINT " ALL AUTHORS AND THEIR
      ABSTRACTS)."BALI
6040 PRINT "[DOWN] ENTER UP TO THREE
      KEYWORDS AND A '$' "BAJM
6070 PRINT " IN AUTHOR FOR KEYWORD
      SEARCH."BAVN
6100 PRINT "[DOWN] TITLE/KEYWORDS
      [SPACE2]-[SPACE2,RVS,SPACE19,
      RVOFF]"BAEH
6130 PRINT TAB(19)"[RVS,SPACE20,RVOFF]
      "CDSG
6160 PRINT "[DOWN] AUTHOR/*/$/[SPACE4]
      -[SPACE2,RVS,SPACE20,RVOFF]"BAYM
6190 PRINT "[DOWN]"BATI
6220 PRINT "[SPACE3]TYPE 'RETURN' -
      TAB"BAUH
6250 PRINT "[SPACE13]'P' - PRINT"BARJ
6280 PRINT "[SPACE13]'V' - VIEW"BAPM
6310 PRINT "[SPACE13]'Q' - QUIT"BASG
6340 PRINT "[DOWN,SPACE13]-->[ ]
      <--"BAMJ
6370 Q=51'BDEJ
6400 GOSUB 700 : REM GET 1ST
      FIELD'CPJH
6430 F1$=B$'BFDG
6460 Q=51+(1*4)'DHQL
6490 GOSUB 700 : REM GET 2ND
      FIELD'CPTP
6520 F2$=B$'BFEG
6550 Q=51+(2*4)'DHRL
6580 GOSUB 700 : REM GET ACTION
      FIELD'CSNQ
6610 SE=1'BDWG
6640 IF A$=CHR$(13) THEN PRINT
      CHR$(146)" "":GOTO 5830'HREP
6670 SE=0'BDVM
6700 IF A$ = "P" OR A$ = "V" THEN
      GOSUB 12250'GJML
6730 IF A$ = "Q" THEN RETURN'ECPL
6760 IF F<> 6 THEN GOTO 5770'FGJP
6790 GOTO 6550'BENP
6820 REM'BARI
6850 REM BELOW ARE TABLES FOR
      MANAGING THE VARIABLE FIELDS OF
      THE FORMS.'BDEB
6880 REM EACH TABLE CONTAINS THE'BUVU
6910 REM COUNT OF ITEMS IN THE DATA
      LIST, IN SETS OF FOUR,
      COMPOSED OF'BYJW
6940 REM START ROW/COLUMN,
      LENGTH AND DEPTH OF FIELD.'BNKW
6970 REM'BARO
7000 DATA 3 : REM NUMBER OF SCREEN
      TABLES'CWMG
7030 DATA 24,5,20,20,2,8,20,20,1,10,
      20,20,1,12,20,20,1,14,20,20,4,
      24'BICN
7060 DATA 18,1,1,8,12,20,20,2,23,18,1,
      1'BERK
7090 DATA 12,12,20,20,2,15,20,20,1,23,
      18,1,1'BJRO
7120 REM'BARC
7150 REM AUTHOR TABLE FULL/EMPTY
      CHECKING AND FILLING ROUTINE'BVTS
7180 REM'BARI
7210 IF AH$(1) <> "" THEN GOTO 7330
      : REM IF TABLE IS NOT EMPTY,
      JUMP'GITO
7240 AT = VAL(P2$)'CHDI
7270 FOR X = 1 TO AT'DETK
7300 INPUT#3, AH$(X): NEXT'CJTE
7330 RETURN'BAQF
7360 REM'BARI
7390 REM CONVERT RECORD POINTER TO
      BINARY'BDWT

```


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```

7420 REM'BARF
7450 R1=VAL(P1$):R2=0: IF R>256 THEN
      R2=INT(R1/256):R1=R1-256*R2'MKPY
7480 RETURN'BAQL
7510 REM'BARF
7540 REM THIS ROUTINE BUMPS "AT",
      THE AUTHOR TABLE POINTER'BNPU
7570 REM AND PUTS THE AUTHOR AND THE
      POINTER "PF$" IN THE TABLE'BOLX
7600 REM'BARF
7630 AH$(AT) = F2$: AT = AT + 1'DQJN
7660 AH$(AT) = PF$: AT = AT + 1
      : AH$(AT) = "ZZZ"EYCU
7690 RETURN'BAQO
7720 REM'BARF
7750 REM DISK ERROR PRINT ROUTINE'BVVR
7780 REM'BARO
7810 PRINT"[HOME]";'BBFI
7840 PRINT B$;"-RETURN' TO ABORT
      [SPACE3]";"[LEFT2]";'BFST
7870 GOSUB 1540'BELP
7900 IF A$>=CHR$(32) AND A$<=CHR$(95)
      THEN PRINT "[LEFT]";
      :GOTO 7870'LSDT
7930 IF A$<>CHR$(13) THEN GOTO
      7870'GKNQ
7960 CLOSE 2:CLOSE 3:CLOSE 1:F=0
      :RETURN'FJUT
7990 REM'BARF
8020 REM DISK ERR CHNL READ
      ROUTINE'BWKJ
8050 REM'BARF
8080 INPUT#1,A,B$,C,D'BKVK
8110 RETURN'BAQC
8140 REM'BARF
8170 REM GARBAGE COLLECTION
      ROUTINE'BYMP
8200 REM'BARC
8230 F1$="":F2$="":F3$="":F4$="":
      :F5$="":U1$="":U2$="":U3$="":
      :U4$="":U5$="":KOGU
8260 K1$(1)="" :K1$(2)="" :K1$(3)=""
      :P1$="" :P2$="" :A$="" :B$=""'HJJT
8270 M=FRE(0):RETURN'DFAM
8290 REM'BARL
8320 REM THIS ROUTINE BUMPS THE TEMP
      ABSTRACT PTR BY 1'BMKQ
8350 REM CONVERTS IT TO BINARY AND
      DOES A SEEK OF THE ABSTRACT
      FILE'BWNW
8380 REM'BARL
8410 TR=TR+1:P1$=STR$(TR)
      :GOSUB 7450'FSMM
8440 PRINT#1,"P" CHR$(2)CHR$(R1)CHR$(
      R2)CHR$(1):RETURN'GRPP
8470 REM'BARL
8500 REM GET THREE KEYWORDS FROM
      SCREEN AND PUT IN TABLE'BOER
8530 REM'BARF
8560 K1$(1)="" :K1$(2)=""
      :K1$(3)=""'DURQ
8590 KX=LEN(F1$):KL=1'DLIS
8620 FOR KC = 1 TO 3'DEAK
8650 FOR KZ = KL TO KX'DGGO
8680 IF MID$(F1$,KZ,1) <> " " THEN
      GOTO 8800'GORU
8710 IF KZ=1 THEN RETURN'EDVL
8740 K1$(KC) = MID$(F1$,KL,
      (KZ-KL))'DWOS
8770 KL = KZ+1 : GOTO 8830'DKTS
8800 NEXT KZ'BCNJ
8830 NEXT KC'BCQM
8860 RETURN'BAQO
8890 REM'BARF
8920 REM KEYWORD SEARCH ROUTINE'BUSR
8950 REM'BARO
8980 KL=1:SW=0'CHNU
9010 KX=LEN(U5$)'CHXF
9040 FOR KZ=KL TO KX'DGGI
9070 IF MID$(U5$,KZ,1) <> " " THEN
      GOTO 9310'GODP
9100 FOR KQ=1 TO 3'DEOE
9130 IF K1$(KQ)<>MID$(U5$,KL,
      (KZ-KL)) THEN GOTO 9250'HBHP
9160 M1$="[RVS,RED]":M2$="[RVOFF,BLUE]
      "'CHTL
9170 U5$=LEFT$(U5$,KL-1)+M1$+MID$(U5$,
      KL,(KZ-KL))+M2$+MID$(U5$,KZ,
      (KX-KZ))'LXWC
9190 KZ=KZ+4:KX=KX+4:SW=1'FPBS
9220 GOTO 9280'BEQG
9250 NEXT KQ'BCEJ
9280 KL=KZ+1'CFAN
9310 NEXT KZ'BCNG
9340 RETURN'BAQI
9370 REM *****
      '*BEFQ
9400 REM * ABSTRACT FILE ADD ROUTINE
      '*BYTM
9430 REM *****
      '*BEFN
9460 IF LEFT$(F1$,1)=" " OR LEFT$(F2$,
      1)=" " THEN F=0: RETURN'JRCU
9462 IF LEFT$(F2$,1)>"9" THEN GOTO
      9490'FLQS
9464 B$="BEGIN AUTHOR WITH LETTER"
      :GOSUB 7810:RETURN'DIWA
9490 OPEN 1,8,15 : REM OPEN COMMAND
      CHANNEL'CAJV
9520 OPEN 2,8,2,"ABSTRACTS"'BGKM
9550 GOSUB 7990'BEBM
9580 IF A<20 THEN GOTO 9940
      : REM IF FILE IS HERE, O.K.'FAOX
9610 IF A=62 THEN GOTO 9760
      : REM FILE ABSENT,
      GO CREATE IT'FEOS
9640 GOSUB 7810:RETURN'CFLN
9670 REM'BARO
9700 REM IT DID NOT EXIST,
      SO CREATE IT THE FIRST TIME'BLYT
9730 REM'BARL
9760 CLOSE 2: OPEN 2,8,2, "ABSTRACTS,
      L,"+CHR$(83)'EMDW
9790 GOSUB 7990:IF A<20 THEN GOTO
      10240'FNWR
9820 GOSUB 7810:RETURN'CFLN

```


64 USERS ONLY/LIBRARY MANAGER

```

9850 REM'BARO
9880 REM GET POINTER RECORD'BQDW
9910 REM'BARL
9940 PRINT#1,"P" CHR$(2)CHR$(1)CHR$(0)
    CHR$(1)'FOFU
9970 GOSUB 7990'BEBS
10000 IF A < 20 THEN INPUT#2,P1$,P2$
    : GOTO 1024 0: REM GET
    POINTERS'GFIB
10030 GOSUB 7810:RETURN
    : REM BAD RETURN'DPXY
10060 REM'BARW
10090 REM WE HAVE TO STORE AND
    RETRIEVE ABSTRACT IN THREE
    PARTS.'BUKH
10120 REM 1ST IS A RECORD WITH TITLE,
    AUTHOR, MAGAZINE TITLE.'BSGA
10150 REM 2ND IS MAGAZINE DATE. 3RD
    IS ABSTRACT ONLY.'BKKB
10170 REM WE DO THIS TO GET AROUND
    THE 88 CHARACTER LIMIT'BNIE
10180 REM OF THE INPUT STATEMENT.'BUTA
10210 REM'BART
10240 GOSUB 7450 : REM CONVERT
    POINTER P1$'CWNE
10270 TR = VAL(P1$)'CHTD
10300 PRINT#1,"P" CHR$(2)CHR$(R1)CHR$(
    R2)CHR$(1)'FQQB
10330 GOSUB 7990: IF A<20 OR A=50
    THEN GOTO 10390'HQGE
10360 GOSUB 7810:RETURN'CFLC
10390 PRINT#2,F1$Z$F2$Z$F3$
    : REM WRITE TITLE AUTHOR AND
    MAGAZINE TITLE'CXQL
10420 PF$=P1$ : REM SET PTR FOR
    AUTHOR TABLE PLUG'CGWB
10450 GOSUB 8410 : REM DATE'CJOD
10480 GOSUB 7990: IF A<20 OR A=50
    THEN GOTO 10540'HQDE
10510 GOSUB 7810:RETURN'CFLY
10540 PRINT#2, F4$ : REM WRITE
    MAGAZINE DATE'CXGB
10570 GOSUB 8410 : REM ABSTRACT'CNSB
10600 GOSUB 7990 : IF A<20 OR A=50
    THEN GOTO 10660'HQGE
10630 GOSUB 7810:RETURN'CFLC
10660 PRINT#2,F5$ : REM FINALLY
    WRITE ABSTRACT!!!'CEYF
10690 REM'BARA
10720 REM NOW LOAD AND UPDATE THE
    AUTHOR TABLE'BFJD
10750 REM'BARD
10780 OPEN 3,8,3,"0:AUTHORS,S,R"'BGPF
10810 GOSUB 7990 : REM IS TABLE
    THERE?'CSIF
10840 IF A = 62 THEN:CLOSE 3
    :OPEN 3,8,3,"0:AUTHORS,S,W"
    :GOTO 10990'GSYH
10870 GOTO 11260'BFFB
10900 REM'BARA
10930 REM THIS IS THE FIRST TIME
    AUTHOR BLOCK FILLING
    ROUTINE'BSYK
10960 REM'BARA
10990 AT = VAL(P2$)'CHDG
11020 GOSUB 7630 :REM GO BUMP TABLE
    POINTERS'CYDB
11050 FOR X = 1 TO AT'DETY
11080 PRINT#3,AH$(X): NEXT'CJJD
11110 GOSUB 7990 : IF A > 20 THEN
    GOSUB 7810 : PRINT#1,"S0
    :AUTHORS":RETURN'HQCE
11140 GOTO 11890'BFOX
11170 REM'BARA
11200 REM THIS IS THE AUTHOR TABLE
    FILL AND UPDATE ROUTINE'BPWA
11230 REM'BARW
11260 GOSUB 7210 : REM GO SEE IF
    AUTHOR TABLE IS FULL, IF NOT,
    FILL IT'CRYG
11290 CLOSE 3'BBKD
11320 IF AT=500 THEN B$="AUTHOR TABLE
    FULL ":GOSUB 7810:RETURN'GNWC
11350 REM'BARA
11380 REM NOW FIND A SPOT IN THE
    TABLE'BWLE
11410 REM'BARW
11440 OPEN 3,8,3, "@0:AUTHORS,S,
    W"'BGKF
11470 GOSUB 7990: IF A > 20 THEN
    GOSUB 7810 : RETURN'GNVD
11500 REM'BARW
11530 REM LOOK FOR AUTHOR, IF HIT,
    FIND END OF POINTERS,
    SHIFT EVERYTHING'BDYJ
11560 REM RIGHT ONE SLOT, IF NO HIT,
    THEN STICK AT END OF TABLE'BRAJ
11590 REM'BARA
11620 FOR Y = 1 TO AT'DEUC
11650 IF F2$ = AH$(Y) THEN Y=Y+1
    :GOTO 11740:REM IF TABLE END,
    FALL THROUGH'HQQL
11680 NEXT'BAEA
11710 GOSUB 7630 : GOTO 11830'CKDD
11740 FOR X = (AT+1) TO Y STEP -1
    : REM SHIFT STUFF'HTGG
    AH$(X) = AH$(X-1): NEXT
    : REM RIGHT ONE SLOT'ECVJ
11800 AH$(Y) = PF$: AT = AT +1'DPEF
11830 FOR X = 1 TO AT'DETF
11860 PRINT#3, AH$(X): NEXT'CJJD
11890 REM'BARD
11920 REM NOW UPDATE P1 AND P2 ,
    WRITE THEM BACK AND RETURN'BOVI
11950 REM'BARA
11980 PRINT#1, "P"CHR$(2)CHR$(1)CHR$(
    0)CHR$(1)'FOFJ
12010 TR = TR + 1 : P1$ = STR$(TR)
    : P2$ = STR$(AT)'GVVD
12040 PRINT#2,P1$Z$P2$'BKPY
12070 GOSUB 7990:IF A>20 THEN GOSUB
    7810'FMFF
12100 GOSUB 8230 : REM DO GARBAGE
    COLLECTION'CYNB
12130 F = 0:CLOSE 2:CLOSE 3:CLOSE 1
    :RETURN'FJUC

```


64 USERS ONLY / LIBRARY MANAGER

```

12160 REM *****
    ***'BEFF
12190 REM * ABSTRACT RETRIEVE ROUTINE
    *'BATE
12220 REM *****
    ***'BEFC
12250 OPEN 1,8,15'BGWB
12280 OPEN 2,8,2,"ABSTRACTS"BGKB
12310 GOSUB 7990'BEBX
12340 IF A > 20 THEN GOSUB 7810
    :RETURN'FIUE
12370 OPEN 3,8,3,"0:AUTHORS,S,R"BGPC
12400 GOSUB 7990'BEBX
12430 IF A > 20 THEN GOSUB 7810
    :RETURN'FIUE
12460 C$=A$'BEAE
12490 CD=1 : REM AUTHOR ONLY
    RETRIEVE'CWXH
12520 IF F1$ = " " AND F2$ = " " THEN
    GOTO 14320'GLMA
12550 IF F1$ <> " " AND F2$ <> " "
    THEN CD = 2 : REM MAKE SAME AS
    CODE TWO'JCOK
12580 IF LEFT$(F2$,1) = "$" THEN CD =
    3 : GOSUB 8560 : REM KEYWORD
    SEARCH'HEVL
12610 IF F1$ <> " " AND F2$ = " "
    THEN CD = 2 : REM ABSTRACT ONLY
    RETRIEVE'IFHH
12640 PRINT#1,"P" CHR$(2)CHR$(1)CHR$(
    0)CHR$(1)'FOFD
12670 GOSUB 7990'BEBB
12700 IF A > 20 THEN GOSUB 7810
    :RETURN'FIUE
12730 INPUT#2,P1$,P2$'BJNF
12760 GOSUB 7210 :REM CHECK/FILL
    AUTHOR TABLE'CBPI
12790 REM'BARD
12820 REM THIS IS THE AUTHOR TABLE
    HUNT ROUTINE'BGCG
12850 REM'BARA
12880 IF LEFT$(F2$,1)="*" OR CD=3 OR
    CD=2 THEN X=1:Z=1
    :GOTO 13120'LYUP
12910 FOR X = 1 TO (AT-1)'EHIB
12940 IF F2$ = AH$(X) THEN X = X + 1
    :GOTO 13120'GSEH
12970 NEXT'BAED
13000 GOTO 14350 : REM NO HIT,
    RETURN TO MENU'CYFB
13030 REM'BARW
13060 REM NOW GO TO THE ABSTRACT FILE
    AND GET DATA AND PRINT'BPLG
13090 REM'BARD
13120 FOR Y = X TO (AT-1)'EHBX
13150 P1$ = AH$(Y)'BJXC
13180 IF LEFT$(P1$,1)>"@" AND Z=1
    THEN 14290 :REM PRNT ALL - SKIP
    NAMES'HHHJ
13210 IF LEFT$(P1$,1)>"@" THEN 14350
    : REM JUMP IF END OF AUTHOR
    POINTERS'FNFE
13240 GOSUB 7450'BERB
13270 TR = VAL(P1$)'CHTA
13300 PRINT#1,"P" CHR$(2)CHR$(R1)CHR$(
    R2)CHR$(1)'FQQE
13330 GOSUB 7990:IF A > 20 THEN GOSUB
    7810:RETURN'GNYA
13360 INPUT#2,U1$,U2$,U3$
    : REM GET TITLE AUTHOR AND
    MAGAZINE TITLE'CTRJ
13390 GOSUB 8410'BEOB
13420 IF A>20 THEN GOSUB 7810
    :RETURN'FIUE
13450 INPUT#2,U4$ : REM GET DATE'CNKB
13480 GOSUB 8410'BEOB
13510 IF A>20 THEN GOSUB 7810
    :RETURN'FIUE
13540 INPUT#2,U5$ : REM GET
    ABSTRACT'CRPC
13570 IF CD=3 THEN GOSUB 8980'EHEE
13600 IF SW <> 1 AND CD = 3 GOTO
    14290 : REM NO KEYWORD HIT'HYVE
13630 IF CD=2 AND U1$<>F1$ THEN 14290
    : REM DOES ABSTRACT MATCH? JMP
    IF NO'HPBL
13660 IF C$ <> "V" THEN GOTO
    14020'FHLE
13690 PRINT "[CLEAR,RVOFF]";'BBÆ
13720 PRINT "[RVS,DOWN]ABSTRACT TITLE
    [RVOFF,DOWN]":PRINT U1$'CEXD
13750 PRINT "[RVS,DOWN]AUTHOR[RVOFF,
    DOWN]":PRINT U2$'CEHE
13780 PRINT "[RVS,DOWN]DOCUMENT TITLE
    [RVOFF,DOWN]":PRINT U3$'CELJ
13810 PRINT "[RVS,DOWN]ABSTRACT DATE
    [RVOFF,DOWN]":PRINT U4$'CEAD
13840 PRINT "[RVS,DOWN]ABSTRACT[RVOFF,
    DOWN]":PRINT U5$'CEKF
13870 PRINT "MORE - Y/N - ";
    :GOSUB 1540'CGFI
13900 IF A$="N" THEN GOTO 14350'EHEB
13930 IF A$ <> "Y" THEN PRINT "[UP]"
    :GOTO 13870'GITG
13960 IF CD=2 THEN GOTO 14320'EIGH
13990 GOTO 14290'BFLH
14020 OPEN 4,4'BDAX
14050 PRINT#4,"ABSTRACT TITLE - ";U1$,
    CHR$(10)'CLRB
14080 PRINT#4,"AUTHOR[SPACE9]- ";U2$,
    CHR$(10)'CLBD
14110 PRINT#4,"DOCUMENT TITLE - ";U3$,
    CHR$(10)'CLAF
14140 PRINT#4,"ABSTRACT DATE[SPACE2]
    - ";U4$,CHR$(10)'CLBB
14170 PRINT#4,CHR$(16) "36ABSTRACT",
    CHR$(10),CHR$(10)'EQKF
14200 PRINT#4,U5$,CHR$(10),CHR$(10),
    CHR$(10)'EUXD
14230 CLOSE 4'BBLA
14260 IF CD=2 THEN GOTO 14320'EIGB
14290 NEXT'BAEA
14320 GOSUB 8230 : REM DO GARBAGE
    COLLECTION'CYNB
14350 F=0: Z=0: SW=0 : CLOSE 2:CLOSE 3
    :CLOSE 1:RETURN'HQEF

```


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```

14380 REM *****
***'BEWF
14410 REM * THIS IS THE DELETE
ROUTINE *'BYMB
14440 REM *****
***'BEWC
14470 IF LEFT$(F1$,1) = " " THEN F=0
: RETURN'GKFG
14500 OPEN 1,8,15'BGWB
14530 OPEN 2,8,2,"ABSTRACTS"'BGKB
14560 GOSUB 7990'BEBB
14590 IF A>20 THEN GOSUB 7810
: RETURN'FIUH
14620 OPEN 3,8,3,"0:AUTHORS,S,R"'BGPC
14650 IF A>20 THEN GOSUB 7810
: RETURN'FIUE
14680 PRINT#1,"P" CHR$(2)CHR$(1)CHR$(
0)CHR$(1)'FOFJ
14710 GOSUB 7990'BEBE
14740 IF A>20 THEN GOSUB 7810
: RETURN'FIUE
14770 INPUT#2,P1$,P2$'BJNF
14800 REM'BARD
14830 REM NOW RETRIEVE ALL ABSTRACTS
UNTIL THE END OR HIT;
IF NO HIT EXIT.'BCFP
14860 REM IF HIT, MARK ABSTRACT TITLE
WITH HIGH VALUE. THEN GO
READ'BWYR
14890 REM AUTHOR TABLE AND SHRINK
TABLE WHERE POINTER IS TO
ABSTRACT FILE.'BEFW
14920 REM'BARA
14950 AB = VAL(P1$)'CHOF
14980 FOR X = 2 TO (AB-3) STEP 3'FINK
15010 T1$ = STR$(X):P1$=RIGHT$(T1$,
LEN(T1$)-1)'GWYF
15040 GOSUB 7450'BERB
15070 PRINT#1,"P" CHR$(2)CHR$(R1)CHR$(
R2)CHR$(1)'FQQE
15100 GOSUB 7990:IF A>20 THEN GOSUB
7810:RETURN'GNYD
15130 INPUT#2,U1$,U2$,U3$'BNID
15160 IF F1$<>U1$ THEN GOTO 15340'FLVC
15190 F2$ = U2$ : U1$ = CHR$(255)
: REM MARK DELETED!!!!'EGCJ
15220 PRINT#1,"P" CHR$(2)CHR$(R1)CHR$(
R2)CHR$(1)'FQQB
15250 GOSUB 7990:IF A>20 THEN GOSUB
7810:RETURN'GNYD
15280 PRINT#2,U1$Z$U2$Z$U3$'BPRD
15310 GOTO 15400'BFFB
15340 NEXT'BAED
15410 CLOSE 3:OPEN 3,8,3,"@0
:AUTHORS,S,W"'CIXB
15370 GOTO 16150 : REM NO HIT,
EXIT'CQEF
15400 GOSUB 7210 : REM CHECK/FILL
AUTHOR TABLE'CBPC
15430 REM'BARD
15460 REM FIND AUTHOR'BKFD
15490 REM'BARD
15520 FOR X = 1 TO (AT-1)'EHIB
15550 IF F2$ = AH$(X) THEN X = X + 1
: GOTO 15640'GSNH
15580 NEXT'BAED
15610 GOTO 16150 : REM NO HIT,
EXIT'CQEC
15640 FOR Y = X TO (AT-1)'EHXE
15670 IF LEFT$(AH$(Y),1)>"@" THEN
16150 : REM NO HIT FOR SOME
REASON'FJCP
15700 IF AH$(Y) = P1$ THEN GOTO
15760'E0HC
15730 NEXT'BAEA
15760 FOR Q = Y TO (AT-1)
: REM SHIFT TABLE'FSQK
15790 AH$(Q) = AH$(Q+1)
: REM LEFT ONE'DVBN
15820 NEXT'BAEA
15850 AT = AT -1'CFIF
15880 FOR X = 1 TO AT'DETI
15910 PRINT#3,AH$(X):NEXT'CJJD
15940 REM'BARD
15970 REM NOW UPDATE P2$ AND WRITE IT
BACK TO FILE'BHLP
16000 REM'BARW
16030 PRINT#1,"P" CHR$(2)CHR$(1)CHR$(
0)CHR$(1)'FOFA
16060 P2$ = STR$(AT):P1$=STR$(AB)'EPRD
16090 PRINT#2,P1$Z$P2$'BKPC
16120 GOSUB 7990: IF A>20 THEN GOSUB
7810'FMFF
16150 GOSUB 8230 : REM DO GARBAGE
COLLECTION'CYNE
16180 F=0: CLOSE 2:CLOSE 3:CLOSE 1
: RETURN'FJUF
16210 REM *****'BQVD
16240 REM * HELP ROUTINE *'BNYB
16270 REM *****'BQVD
16300 POKE 53280,0:POKE 53281,5'CPQE
16330 PRINT "[BLACK]"'BAQE
16360 PRINT "[CLEAR,DOWN4]"'BAMB
16390 PRINT " PERSONAL LIBRARY
MANAGER IS USED FOR"'BAJN
16420 PRINT " STORING, RETRIEVING,
AND DELETING"'BAKG
16450 PRINT " INFORMATION (IE.
ABSTRACTS) ON DOCU-" 'BAVK
16480 PRINT " MENTS IN A DATA BASE.
MINIMUM EQUIP-" 'BANN
16510 PRINT " MENT AND SOFTWARE
REQUIREMENTS ARE:" 'BACH
16540 PRINT "[DOWN,SPACE3]
- C64 COMMODORE COMPUTER," 'BADH
16570 PRINT "[SPACE3]- C1541 DISK
DRIVE, OR COMPATIBLE[SPACE2]
"'BAUM
16600 PRINT "[SPACE5]UNIT," 'BATE
16630 PRINT "[SPACE3]- VIDEO MONITOR,
"'BAMF
16660 PRINT "[SPACE3]- AND ROM
BASIC." 'BACH
16690 PRINT "[DOWN] OPTIONAL
EQUIPMENT IS AN MPS 801 "'BASP
16720 PRINT " PRINTER OR COMPATIBLE

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```

UNIT."BAII
16750 PRINT "[DOWN,SPACE12]
      CONTINUE - Y/N - ";
      :GOSUB 1540'CGYL
16780 IF A$="N" THEN F=0:RETURN'FFKK
16810 IF A$<>"Y" THEN PRINT "[UP2]"
      :GOTO 16750'GIPG
16840 PRINT "[CLEAR]"BATE
16870 PRINT " TO USE THIS PROGRAM,
      SIMPLY FILL IN"BALQ
16900 PRINT " THE BLANKS ON THE
      VARIOUS SCREEN FORMS"BAJL
16930 PRINT " AND GIVE THE FORM THE
      APPROPRIATE"BAAM
16960 PRINT " COMMAND.[SPACE2]
      HERE ARE SOME HINTS FOR"BASP
16990 PRINT " USING THE FORM COMMANDS
      :BBAJQ
17020 PRINT "[DOWN,SPACE3]
      - 'Q'UIT ALWAYS RETURNS TO THE
      PRE-"BAOE
17050 PRINT "[SPACE5]VIOUS FORM;
      AT THE GREETING FORM"BAWG
17080 PRINT "[SPACE5]IT DOES A KERNAL
      COLD START,"BAUI
17110 PRINT "[SPACE3]- 'P'ROCESS
      MAKES THE DESIRED ACTION"BAWE
17140 PRINT "[SPACE5]TAKE PLACE,"BAZB
17170 PRINT "[SPACE3]- 'V'IEW SHOWS

```

```

ON THE MONITOR ONLY,"BABK
17200 PRINT "[SPACE3]- 'P'INT SHOWS
ON THE PRINTER ONLY,"BAFE
17230 PRINT "[SPACE3]- 'RETURN' MOVES
THE CURSOR TO THE"BACG
17260 PRINT "[SPACE5]NEXT FIELD AND
PLACES YOUR DATA"BAMJ
17290 PRINT "[SPACE5]INTO THE DISK
BUFFER.[SPACE2]AT THE "BALL
17320 PRINT "[SPACE5]ACTION FIELD,
IT MOVES THE CUR-"BAUG
17350 PRINT "[SPACE5]SOR BACK TO THE
FIRST DATA FIELD,"BAGJ
17380 PRINT "[SPACE3]- 'DEL' DELETES
THE LAST CHARACTER,"BASM
17410 PRINT "[SPACE3]- AND FINALLY,
CHANGING AN ABSTRACT"BAUH
17440 PRINT "[SPACE5]CAN BE EFFECTED
BY DELETING THEN"BACJ
17470 PRINT "[SPACE5]ADDING THE
DESIRED DOCUMENT."BAXL
17500 PRINT "[DOWN,SPACE12]
CONTINUE - Y/N - ";
      :GOSUB 1540'CGYF
17530 IF A$="N" THEN F=0:RETURN'FFKE
17560 IF A$<>"Y" THEN PRINT "[UP2]"
      :GOTO 17500'GIJG
17590 GOTO 16360'BFLH
17950 END'BACG

```

END

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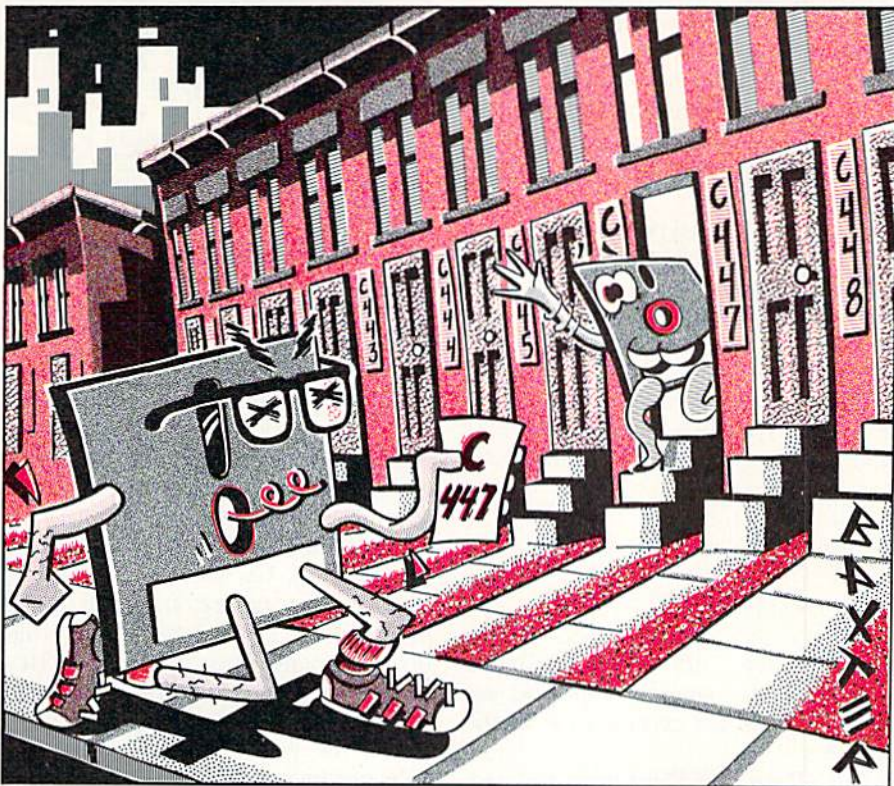
The Ultimate Disk Directory for the 1526 or MPS-802 Printers

If you have a 1526 or MPS-802 printer, the Ultimate Disk Directory can be yours in 60 minutes. What is the ultimate directory?—let's think about the answer. A printed directory should be easy to read, and should list programs alphabetically or in their sequence on the disk. It should have space for a date or other comment, no matter how full the disk. It should fit easily into a notebook, or better yet, into or onto the disk envelope, with no need for scissors, paste or tape. Sounds like a big order, doesn't it?

Well, the 1526 and MPS-802 printers, with their variable line spacing capability, can easily do the ultimate directory. The accompanying program, which you can have running in less than an hour, is the key to ultimate success. It makes several types of printed directory, each carefully fitted to a single sheet of paper, and each carefully planned to fill specific needs.

The simplest type is called the Notebook Sheet. Its margins are suited to three-ring binding, and it holds up to 72 entries in each of two columns, so a single sheet can hold 144 file names, the most that will fit on a diskette. If you bind your directories or keep them in folders, the Notebook Sheet will fill your every need.

But the Folding Sheet is what adds the ultimate touch. You may have noticed that an 8 1/2" x 11" sheet, folded into fourths, fits perfectly into a diskette envelope. If it's slipped behind the disk, a 1/8" tab of paper extends beyond the top of the disk, making a perfect place for a label. The Folding Sheet puts the disk name on that tab, and a drawer full of disks with these labels exposed is a beauti-



A drawer full of disks with these labels exposed is a beautiful thing to behold—at one glance, you see the name of every disk in the drawer. And if a disk is out on the desk, you can find its home in an instant.

ful thing to behold—at one glance, you see the name of every disk in the drawer. And if a disk is out on the desk, you can find its home in an instant. But the ultimate doesn't stop there. It puts 48 file names in each quadrant, avoiding the space near the folds, so nothing gets crunched by a crease! If there are file names out of sight below the fold, there's a note to

that effect.

Both sheets have a title line, in a triply useful form. First of all, the disk name and i.d. are *not* in reverse field; the plain text format improves their readability. Second, the title line shows the number of files on the disk, handy to know when you're looking for space. Last and most importantly, the title line has a ten-character comment field, filled by you when the directory is printed. I use mine to date my printouts, and I've found it to be most helpful.

Either sheet can be printed in alphabetic order or in the sequence of the files on the disk. If you want to look before you print, you can dump the directory to the screen, where it gives you a screenful of data, then asks for a keypress before it gives you more. That's typical of the niceties in this finely-tuned utility.

Others are informative prompts, and signal tones that sound at appropriate times. It's easy to change the disk and printer device numbers, as well as the default colors. The program has been tested on directories from tiny to huge, and everything has been proven to work. You can even put colons and commas in your label, with never an "extra ignored" error.

64 USERS ONLY / ALPHABETIZER

Typing the Program

The program is an augmented version of the Directory Alphabetizer that appeared in *Commodore Power/Play*, February/March 1985. If you have the original program, follow this procedure to upgrade it with a minimum of typing:

1. Load the original program.
2. In line 170, change OPEN1,8,0 to OPEN1,DN,0
3. In line 270, change B = 3 to B = 4
4. Change line 330 from IFM = 0 THEN 470 to IFM = 0 THEN RETURN
5. Delete lines 100-140, 370, 400, and 470-510. (They won't do harm if you leave them in, but they *will* confuse your listing.)
6. Add these lines:
30 GOTO 730
40 :
295 RETURN
296 :

(Lines 40 and 296 consist of a line number and a single colon, and are there to highlight certain areas of the listing.)

7. Add lines 600-1680 from the program printed in this issue.

The resulting program will be identical to the accompanying listing, but you will not have had to retype lines up to 460.

If you do NOT have the original Directory Alphabetizer, just type in the accompanying program. Be careful with the line numbers in lines up to 460, since they are a bit irregular.

Using the Program

The program is simple and self-explanatory, but there are a few fine points in setting up the printer. Of course, it was designed for the Commodore 1526 and MPS-802 printers, and uses several of their special features. If you have a different printer, you must change the program to suit it.

Your directories will look best if the tractors are in their maximum leftward position. Slide the left tractor all the way left, then adjust the right one to fit your paper. If the tractors are elsewhere, your output will still be

Create a printed disk directory that fits on a single sheet of paper and can be stored flat in a notebook or folded and stashed in the disk's envelope.

useful, but not quite so perfectly spaced.

The landmark for "top of form" is easy to find, but harder to describe. Locate the paper bail on your printer—the roller assembly that holds the paper against the platen. (It's the movable rod with two black rollers, right above the printhead.) When the paper bail is lowered, it rests just below a 1-1/4" flat silver bar that runs the width of the platen. On my 1526, this bar is labeled with instructions for tractor use and ribbon replacement. The front of the bar bends downward at an angle, extending 3/16", and stopping at the platen. The top edge of this bend is the landmark for your top of form. When the program tells you to, "Align top of paper with top of silver bar," place the top of your sheet exactly even with this bend. When it is properly positioned, the paper edge will be about 1/4" above the paper bail rollers, aligned with the bend and the top surface of the silver bar.

On a Folded Sheet, the printed lines are very close together, and the slightest paper slippage can make them overlap. To minimize such slippage, move the paper lever rearward to the so-called "friction position." The paper lever is found to the left of the silver bar. When you've finished doing Folded Sheets, return it to the "tractor position."


When you print a Folded Sheet, the

printer wastes a sheet of paper before it starts to print. This gets the label line at the very top of the next sheet, and is an unavoidable design restraint. If you're doing multiple Folded Sheets, you can manually back up the paper between sheets, so the wasted one is actually the previous Folded Sheet. Also with the Folded Sheet, top-of-form alignment is extremely critical, since we're putting a title so high on the page. Practice makes perfect, and after running a few sheets, you'll be lining them up like a master.

When folding a sheet, it's best to fold it side to side first, then from top to bottom. That way you can access programs 49-96 just by flipping the directory over. Only programs 97-144 need any further unfolding, and few disks will have that many programs.

Lines 730-770 in the program control the drive and printer device numbers, plus the default colors for border, screen and printed characters. To change any of these parameters, just change the appropriate line.

The program does have one bug, but it's a minor one, and fixing it seems more trouble than it's worth. Since the strings describing file names contain quotes before and after the actual file name, the quotes are sorted along with the names. That makes "123" show up after "123 KICK," because the second quote in "123" has a higher ASCII code than the space in the same position in "123 KICK." In the usual sorting sequence, of course, 123 would come *before* 123 KICK. Oh well ... not even ultimate is perfect!

That's all there is to printing the Ultimate Directory. I've used it for several months, and it's been a blessing in organizing my disks. When running the program, I also keep the wedge in memory, in case I need to rename, scratch or copy a file. I also like to validate my disks from time to time, and directory time is a good occasion to do it. It wouldn't be hard to put R, S, C and V commands in the directory program itself. Perhaps that could be your next challenge. 

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program."

Ultimate Directory

```
150 PRINT "[DOWN] ** READING THE  
    DIRECTORY **" : BACH
```

```
160 DIM F$(144) : B=6 : C=2 : QS=CHR$(34)  
    : RS="[RVS]" : SP$="[SPACE17]" : HCWN  
170 OPEN 1,DN,0,"$":GET#1,AS,BS : CQPG  
180 GET#1,AS,BS : REM LINK : CNPH
```


64 USERS ONLY / ALPHABETIZER

```

190 GET#1,AS,B$;NB=ASC(AS+CHR$(0))
+256*ASC(B$+CHR$(0))
:REM NUMBER OF BLKS'LQHU
200 GET#1,B$;IF ST<>0 THEN 290'FMAB
210 IF B$<>CHR$(34) THEN 200'EJNC
220 GET#1,B$;IF B$<>CHR$(34) THEN
SS=SS+B$;GOTO 220'JWQI
230 GET#1,B$;IF B$=CHR$(32) THEN
230'FPDF
240 C$="":IF A=0 THEN C$=" 'FHYE
250 C$=C$+B$;GET#1,B$;IF B$<>" THEN
250'HSEJ
260 F$(A)=LEFT$(R$+Q$+SS+Q$+SP$,
19)+LEFT$(C$,B)+"[RVOFF]
"+MID$(STR$(NB)+SP$,2,C)'NPGU
270 S$="":R$="":A=A+1:B=4:C=5'GPDK
280 IF ST=0 THEN 180'DGIH
290 CLOSE 1:N=A-1:B$=MID$(STR$(NB)+"
BLOCKS FREE,"+STR$(N)+" FILES.",
2)'KURV
295 RETURN'BAQK
296 : 'ABHL
300 PRINT"[DOWN] ** SORTING THE
DIRECTORY **" 'BAVE
310 M=N'BCBY
320 M=INT(M/2)'DFXC
330 IF M=0 THEN RETURN'ECNC
340 J=1:K=N-M'DGTE
350 I=J'BCSD
360 L=I+M'CDLF
380 IF F$(I)<F$(L) THEN 440'DNKJ
390 T$=F$(I):F$(I)=F$(L):F$(L)=T$'DBSN
410 I=I-M'CDJB
420 IF I<1 THEN 440'DFVC
430 GOTO 360'BDIC
440 J=J+1'CDHE
450 IF J>K THEN 320'DFNG
460 GOTO 350'BDHF
600 : 'ABHA
610 REM **** MPS-802/1526 PRINTER
ENHANCEMENT'BJCK
620 REM'BARC
630 REM * EITHER PRINTED
DIRECTORY'BXSK
640 REM * WILL LIST UP TO 144 FILES
ON'BXEL
650 REM * ONE SHEET. THE FOLDING
SHEET'BAIM
660 REM * FITS PERFECTLY INTO A
DISK'BXQN
670 REM * ENVELOPE, BUT WASTES
PAPER'BYYO
680 REM * BEFORE IT IS PRINTED.
THE'BWBO
690 REM * NOTEBOOK SHEET HAS
MARGINS'BYCQ
700 REM * FOR PUNCHED HOLES &
NOTES.'BXEH
710 : 'ABHC
720 REM **** INITIALIZATION'BSTI
730 DN=8 : REM DISK DRIVE DEVICE
NUMBER'CAXM
740 PN=4 : REM PRINTER DEVICE
NUMBER'CXIM
750 BO=14: REM BORDER COLOR'CQXL
760 SC=6 : REM SCREEN COLOR'CPIM
770 CH=14: REM CHARACTER COLOR'CTSO
780 : 'ABHJ
790 REM **** MAIN LOOP'BMYN
800 POKE 53280,BO:POKE 53281,SC
:POKE 646,CH:REM SET UP
COLORS'ELNN
810 PRINT CHR$(142)"[CLEAR] [CMDR @38]
":REM GRAPHICS'DOWI
820 PRINT"[RVS] PRINT DIRECTORY - BY
LOUIS F. SANDER "'BAAO
830 PRINT"[DOWN2,SPACE3]
THIS PRINTS YOUR DISK DIRECTORY,
"'BAQP
840 PRINT"[DOWN,SPACE3]
OPTIONALLY IN ALPHABETICAL ORDER,
"'BASQ
850 PRINT"[DOWN,SPACE3]
ON THE 1526 PRINTER OR THE
SCREEN.[DOWN]" 'BAOQ
860 PRINT"[DOWN,SPACE3]INSERT A DISK,
THEN PRESS A KEY..."
:GOSUB 1610'CFGT
870 INPUT"[DOWN,SPACE3]
SORT IN ALPHABETICAL ORDER[SPACE2]
Y[LEFT3]";B$'BDEU
875 IF LEFT$(B$,1)="Y" THEN SO=1'FJIT
880 PRINT"[DOWN,SPACE8,CMDR @23]" 'BAYB
890 PRINT"[SPACE5]-- [RVS]
READING THE DIRECTORY [RVOFF]
--" 'BAXT
900 PRINT"[DOWN,SPACE5]
(THIS TAKES A FEW SECONDS,
SO" 'BARL
910 PRINT"[DOWN,SPACE5]
I'LL BEEP WHEN I'M
FINISHED.)" 'BAAM
920 GOSUB 160:REM READ DIRECTORY'CROK
930 F$(0)=MID$(F$(0),3,
16)+" "+MID$(F$(0),21,2)+"[SPACE9]
"+CHR$(13):A=0'JLWU
940 GOSUB 1660:REM BEEP'CJMK
950 IF SO THEN GOSUB 1130
:REM SORT'ELEN
960 PRINT"[CLEAR,DOWN3,SPACE3]
TO PRINT A FOLDING SHEET, PRESS
[RVS]F1[RVOFF]" 'BASU
970 PRINT"[DOWN,SPACE2]
TO PRINT A NOTEBOOK SHEET, PRESS
[RVS]F3[RVOFF]" 'BAHU
980 PRINT"[DOWN,SPACE5]
TO PRINT TO THE SCREEN, PRESS
[RVS]F5[RVOFF]" 'BAMV
990 GOSUB 1610:OD$=A$'CKRP
1000 IF OD$="[F1]"OR OD$="[F3]
" THEN GOSUB 1200:GOTO 1030
:REM F1/F2=PRINTER'IEXF
1010 IF OD$="[F5]" THEN GOSUB 1540
:GOTO 1030:REM F5=SCREEN'GWPD
1020 GOTO 990'BDRV
1030 INPUT"[DOWN,SPACE6]

```


64 USERS ONLY / ALPHABETIZER

```

PRINT IT AGAIN (Y OR N)[SPACE2]N
[LEFT3]";B$:B$=LEFT$(B$,1)'DMXJ
1040 IF B$<>"Y"AND B$<>"N"THEN
1050 IF B$="N"THEN 1100'DGPB
1060 IF B$="Y"THEN IF SO=1 GOTO
1070 INPUT"[DOWN,SPACE3]
SORT IN ALPHABETICAL ORDER
[SPACE2]Y[LEFT3]";B$'BDEL
1075 IF LEFT$(B$,1)="Y"THEN SO=1'FJIK
1080 IF SO THEN GOSUB 1130
:REM SORT'ELEG
1090 A=0:GOTO 960'CGHE
1100 END'BACT
1110 : 'ABHU
1120 REM **** PRINT MESSAGE/SORT/BEEP
'BND
1130 PRINT"[SPACE6,CMDR @27]"'BAQP
1140 PRINT"[SPACE3]-- [RVS]
SORTING - WAIT FOR BEEPS.
[RVOFF] --" 'BASH
1150 GOSUB 310:REM SORT'CIYC
1160 GOSUB 1660:GOSUB 1660
:REM 2 BEEPS'DQMF
1170 RETURN'BAQB
1180 : 'ABHC
1190 REM **** PRINT ON PRINTER'BSHI
1200 PRINT"[DOWN2,SPACE9]
DATE OR COMMENT[DOWN,RIGHT3,
CMDR T10,LEFT13,UP]";'BBGQ
1210 I=1026+40*PEEK(214)+POS(0)
:POKE I,34'HUJE
1215 POKE I+54272,SC:POKE 631,29
:POKE 198,1'EWII
1220 B$="":INPUT B$:IF LEN(B$)>10
THEN 1200'GQWD
1230 PRINT"[DOWN2,SPACE5]
ALIGN TOP OF PAPER WITH TOP
OF" 'BAWH
1240 PRINT"[SPACE5]SILVER BAR,
THEN PRESS A KEY..."
:GOSUB 1610'CFYJ
1250 OPEN 10,PN,10:PRINT#10:CLOSE 10
:OPEN 4,PN:REM RESET PRINTER'FHML
1260 J=22:K=96:L=48:C$=B$
:IF OD$="[F3]"THEN J=27:K=72:L=36
:GOTO 1280:REM F3'MPWS
1270 OPEN 3,PN,3:PRINT#3,CHR$(53)
:CLOSE 3:PRINT#4,"[CLEAR,HOME]"
:U$="[DOWN]-MORE-":REM SKIP'HBEQ
1280 OPEN 6,PN,6:PRINT#6,CHR$(J)
:CLOSE 6:REM SET LINES PER
INCH'FFXN
1290 CMD 4'BBIE
1300 C=0:M=N:IF N>K THEN M=K'GKVC
1310 PRINT SPC(21)"("MID$(STR$(N),
2)")[SPACE2]"B$CHR$(141);
:REM #FILES & COMMENT'GIHJ
1320 FOR I=0 TO M'DDGA
1325 PRINT SPC(-3*(I>0))RIGHT$(F$(I),
C)LEFT$(F$(I),LEN(F$(I))-C);
:C=5'KKGQ
1330 IF I=0 THEN PRINT:GOTO 1440'FHED
1340 IF N=<K THEN 1370:REM 1 COLUMN
ONLY'FSFI
1350 IF B$>" "THEN PRINT SPC(18);
:IF I+K=N+1 THEN PRINT B$;
:B$=" "'MUFN
1360 IF I+K=<N THEN PRINT
RIGHT$(F$(I+K),C)LEFT$(F$(I+K),
LEN(F$(I+K))-C);'NHCR
1370 PRINT'BACD
1380 IF N=<L THEN U$=" "'FEQI
1390 IF U$=" "THEN 1440:REM NO FOLDS
NEEDED'EUSM
1400 IF I<>L THEN 1440:REM NOT AT
FOLD POINT'FVQE
1410 PRINT:PRINT SPC(13)U$;
:IF N=144 THEN PRINT SPC(29)B$;
:B$=" "'JXTI
1420 PRINT:PRINT:PRINT'EDSC
1430 IF N=<K THEN U$=" "'FEPE
1440 NEXT'BAEB
1450 IF U$=" "AND N=144 THEN PRINT
SPC(45);'HKBI
1460 IF U$=" "THEN PRINT"[SPACE3]"B$
:GOTO 1480'FKUI
1470 PRINT:PRINT SPC(13)U$SPC(35)
B$'EMAI
1480 IF K=72 THEN FOR I=1 TO 83-M
:PRINT:NEXT:REM FORM FEED FOR
NOTEBOOK SHEET'KKWU
1490 IF K=96 THEN FOR I=1 TO
113-M+5*(N>48)+(N=96)+(N>96)
:PRINT:NEXT:REM PAGE'RHLV
1500 B$=C$:U$="":PRINT#4:CLOSE 4
:OPEN 10,PN,10:PRINT#10:CLOSE 10
:REM RESET'IILK
1510 RETURN'BAQY
1520 : 'ABHA
1530 REM **** PRINT ON SCREEN'BRHG
1540 PRINT"[CLEAR,RVS]";:C=0'CEQE
1550 FOR I=0 TO N:PRINT RIGHT$(F$(I),
C)LEFT$(F$(I),LEN(F$(I))-C):C=5
:A=A+1'LLYR
1560 IF A=21 THEN A=0:PRINT"[DOWN]
PRESS A KEY TO CONTINUE..."
:GOSUB 1610:PRINT"[UP3]"'HMST
1570 NEXT:PRINT B$'CEBH
1580 RETURN'BAQY
1590 : 'ABHH
1600 REM **** WAIT FOR KEYPRESS'BTAE
1610 POKE 198,0'BFXB
1620 GET A$:IF A$=" "THEN 1620'EJGF
1630 RETURN'BAQC
1640 : 'ABHD
1650 REM **** MAKE A BEEP'BNCH
1660 SD=54272:POKE SD+6,241
:POKE SD+4,33:POKE SD+1,21'HECQ
1665 FOR I=0 TO 15 STEP 3:POKE SD+24,I
:NEXT:FOR I=1 TO 200:NEXT'LUUV
1670 POKE SD+4,32:POKE SD+24,0
:FOR I=1 TO 24:POKE SD+I,0
:NEXT'KAMR
1680 RETURN'BAQH

```

END

Your 1985 Federal Income Tax for the Commodore 64 or 128

The Internal Revenue Service (IRS) has pointed out that when people prepare their federal income tax, many copy the wrong figure from the tax tables. In fact, this is the most common error made on income tax returns.

Now that tax season is here again, we have a short BASIC program that will prevent any such error. It needs no special instructions. All you have to do is type it in and run it.

Don't expect this program to prepare your complete income tax return. For that, you better look at commercially available programs, or pay your accountant. But once you have reached page two on either Form 1040 or Form 1040A, and found your Adjusted Gross Income on the top line, the program will readily tell you your taxable income and the tax on it. No more errors and correction letters from the IRS!

Whether you are married, single, or whatever, you will even find out whether you gain with itemized deductions or should consider taking the deduction for charitable contributions, instead.

After this, you are again on your own with regard to withholdings, penalties, and other goodies to be found on the rest of the IRS forms.

The program will run on your Commodore 64 or 128. For the 128, it will operate in either the 40- or the 80-column mode, depending on your preferences. You can look at the results on your screen and/or on a printer.

Program Technique

When typing in the program, you can omit all REM lines. Just be careful to enter the data lines correctly. Blame the IRS for the complexity; they went as far as using decimal fractions this year.

*Copying the wrong
figure from the tax
tables is the most
common error made
on income tax returns.
This program helps
prevent that error.*

The data in lines 2000 to 5010 are the IRS 1985 Tax Rate Schedules for every filing status. In order to ensure accuracy, the program checks these data each time it runs. If you made a mistake in typing in these data, it will tell you the section where there is an error. But remember, the IRS will not accept excuses such as, "I didn't do that; my computer did it."

For taxable incomes of \$50,000 or above, these data are used to directly compute the tax.

But the key to the program is contained in lines 400 to 426 for taxable incomes of less than \$50,000. Essentially, the voluminous tax tables are replaced by a mathematical technique of interpolation. By manipulating the data from the tax tables, the program constructs a single line out of the more than 4,000 possible tax values. It is the one line which is

needed for your specific filing status and taxable income. Simple arithmetic is then used to calculate your tax.

Program Test

As an extra precaution that all lines are typed correctly and that there is no program glitch, you may want to perform this test.

Answer the program prompts as follows:

```
SELECT 1 OR 2? 2 (1040 - Long Form)
NUMBER: ? 2 (Filing Status MFJ)
(FROM 1040, LINE 6 F): ? 4 (Number
of your exemptions)
(FROM FORM 1040 LINE 33): ?
20000 (Adjusted Gross Income)
DID YOU ITEMIZE ? YES
SUMMARY LINE 24: ? 3000
DO YOU WANT TO TRY THE CHARITABLE CONTRIBUTIONS INSTEAD ? YES
CASH (LINE 34B): 100
NONCASH (LINE 34C): ? 0
DO YOU WANT TO RECONSIDER ? YES
CASH (LINE 34B): ? 200
NONCASH (LINE 34C): ? 10
```

The result on your screen or printer should show, at the bottom, a taxable income of 15,735, and the tax from tax table as 1,663. If you get any other result, you have an error in the program.

If everything tests correctly, you might even use this program to check the figures with which your spouse or tax preparer has come up!

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program."

If you are using a Commodore 128 in 128 mode, omit the apostrophe and last four letters at the end of each program line.

1985 Federal Income Tax

```
4 : REM RUNS ON C-64 AND C-128 (40 OR 80 COLUMN
WIDTH) 'BNNM
```

Continued

PROGRAMMERS' TIPS / INCOME TAX

```

6 : REM ALL REM LINES CAN BE
  OMITTED'BYLL
10 : REM CONTROL SECTION'BPEB
12 CLR:GOSUB 502:PRINT CL$'DICC
14 PRINT SPC(6)"YOUR 1985 FEDERAL
  INCOME TAX"'CCVJ
16 GOSUB 602:PRINT SPC(9)"WHICH IRS
  FORM?":PRINT'EHSK
18 PRINT SPC(6)"1[SPACE2]
  1040A - SHORT FORM"'CCRL
20 PRINT SPC(6)"2[SPACE2]
  1040" SPC(2)"- LONG FORM"
  :PRINT'EFKF
22 INPUT"SELECT 1 OR 2";F
  :IF F<1 OR F>2 THEN 16'GJKJ
24 IF F=1 THEN F$=S$+"FORM 1040A"'FGAI
26 PRINT CL$'BDAF
28 PRINT R$ "PAGE 1" F$'BEKI
30 PRINT:GOSUB 202:PRINT
  :GOSUB 602'EJMD
32 PRINT UP$ R$ "PAGE 2" F$:PRINT'CILF
34 PRINT AG$ SPC(6) R$ "> NO COMMA <"
  :PRINT"(FROM" F$ S$;'DNCL
36 IF F=1 THEN PRINT"LINE 15):";'EDVK
38 IF F=2 THEN PRINT"LINE 33):";'EDWM
40 INPUT AGI:AGI=INT(AGI+.5)
  :PRINT'FPBG
42 IF F=1 THEN D3=0:GOSUB 802
  :GOTO 54'GMOI
44 INPUT"DID YOU ITEMIZE (YES OR NO)";
  Y$'BDMM
46 YY$=LEFT$(Y$,1)'CJWJ
48 IF YY$<>"Y" AND YY$<>"N" THEN
  PRINT"TRY AGAIN":GOTO 44'JJWT
50 IF YY$="Y" THEN GOSUB 302
  :GOTO 54'FJWG
52 GOSUB 602:GOSUB 802:PRINT'DING
54 AD=AGI-D3-CH:IF AD<0 THEN AD=0'HQEN
56 TA=AD-EX:IF TA<0 THEN TA=0
  :GOTO 102'HRVP
58 IF TA<=ZBA THEN TX=0:GOTO 102'GMLP
60 IF F=1 AND TA=>50000 THEN 6002'GNPI
62 PRINT CL$ "READING DATA-PLEASE
  WAIT" YY "SECONDS"'BFDO
64 GOSUB 1102'BEFH
66 A=INT(TA+.5)'DHEL
68 IF TA=>50000 THEN GOSUB 1002
  :GOTO 102'GPVQ
70 GOSUB 402'BDJE
100 : REM PRINT SECTION'BNGY
102 PRINT CL$'BDAX
104 PRINT SPC(10)"YOUR 1985" F$'CFDD
106 GOSUB 604'BDNC
108 PRINT R$ S$ "PAGE 1:" B$;'BHMJ
110 PRINT SPC(2)"FILING STATUS
  : " SPC(6) N$ "(" C$ )"'"DIHD
112 PRINT SPC(10)"NUMBER OF" S$ YES "
  : " E$'CKTE
114 GOSUB 602'BDLB
116 PRINT UP$ R$ S$ "PAGE 2:"'BHDF
118 IF F=1 THEN 164'DFUG
120 Q=AGI:PRINT AG$ SPC(5)"33
  : "SPC(FN Q(Q)) Q'FQCE
122 IF YY$="N" THEN 138'DGOC
124 Q=D3:PRINT IS$ SPC(4)"34A
  : "SPC(FN Q(Q)) Q'FPXI
126 PRINT CH$ CK$'BGYE
128 PRINT L1$ SPC(7)"34B
  : " D$ SPC(4) CK$'DMRK
130 PRINT L2$ SPC(4)"34C
  : " D$ SPC(4) CK$'DMQD
132 PRINT L3$ SPC(6)"34D
  : " D$ SPC(4) CK$'DMUF
134 PRINT L4$ SPC(15)"34E
  : " SPC(3) D$'DKWG
136 GOTO 150'BDFF
138 PRINT IS$ SPC(4)"34A
  : " SPC(3) D$'DJVK
140 PRINT CH$ CK$'BGYA
142 Q=CA:PRINT L1$ SPC(7)"34B
  : " SPC(FN Q(Q)) Q;CK$'FTPJ
144 Q=CO:PRINT L2$ SPC(4)"34C
  : " SPC(FN Q(Q)) Q;CK$'FTDL
146 Q=CT:PRINT L3$ SPC(6)"34D
  : " SPC(FN Q(Q)) Q;CK$'FTMN
148 Q=CH:PRINT L4$ SPC(15)"34E
  : " SPC(FN Q(Q)) Q'FQTO
150 Q=AD:PRINT SU$ SPC(15)"35
  : " SPC(FN Q(Q)) Q'FQJH
152 Q=EX:PRINT YE$ SPC(11)"36
  : " SPC(FN Q(Q)) Q'FQUJ
154 Q=TA:PRINT TA$ SPC(12)"37
  : " SPC(FN Q(Q)) Q'FQFL
156 IF TA=>50000 THEN PRINT L5$ "38
  : ";'FLNM
158 IF TA<50000 THEN PRINT L6$
  SPC(5)"38: ";'FNXO
160 Q=TX:PRINT SPC(FN Q(Q)) Q'EKHG
162 GOTO 186'BDOE
164 Q=AGI:PRINT AG$ SPC(5)"15
  : " SPC(FN Q(Q)) Q'FQCM
166 PRINT CH$'BDVI
168 Q=CA:PRINT L1$ SPC(7)"16A
  : " SPC(FN Q(Q)) Q'FPIQ
170 Q=CO:PRINT L2$ SPC(4)"16B
  : " SPC(FN Q(Q)) Q'FPVJ
172 Q=CT:PRINT L3$ SPC(6)"16C
  : " SPC(FN Q(Q)) Q'FPFL
174 Q=CH:PRINT L4$ SPC(15)"16D
  : " SPC(FN Q(Q)) Q'FQSN
176 Q=AD:PRINT SU$ SPC(15)"17
  : " SPC(FN Q(Q)) Q'FQJP
178 Q=EX:PRINT YE$ SPC(11)"18
  : " SPC(FN Q(Q)) Q'FQUR
180 Q=TA:PRINT TA$ SPC(12)"19
  : " SPC(FN Q(Q)) Q'FQFK
182 GOSUB 602'BDLG
184 Q=TX:PRINT L6$ SPC(5)"20
  : " SPC(FN Q(Q)) Q'FPFO
186 GOSUB 604'BDNK
188 IF YY$="Y" THEN GOSUB 702'EGHP
190 IF PR$<>"Y" THEN 902'EGFI
192 PRINT SPC(13) UP$ "GOOD LUCK";
  'CHEL
194 IF PR$="Y" THEN PR$="":PRINT#4
  :CLOSE 4:PRINT UP$:GOTO 192'ISNR

```


PROGRAMMERS' TIPS / INCOME TAX

```

196 END'BACK
200 : REM FILING STATUS'BNBA
202 PRINT"FILING[SPACE2]STATUS:"
:PRINT'CBSD
204 PRINT SPC(2)"1"SPC(4)"SINGLE
(S)"DESE
206 PRINT SPC(2)"2"SPC(4)"MARRIED
FILING JOINTLY (MFJ)"DERM
208 PRINT SPC(2)"3"SPC(4)"MARRIED
FILING SEPARATELY (MFS)"DEIP
210 PRINT SPC(2)"4"SPC(4)"HEAD OF
HOUSEHOLD (HH)"DETF
212 IF F=2 THEN PRINT SPC(2)"5"SPC(4)
"QUALIFIED WIDOW(ER) (QW)"GGGK
214 PRINT:INPUT"NUMBER:";N%'CEQF
216 IF N%>0 AND N%<6 THEN 222'FJNI
218 PRINT:PRINT SPC(3)"PLEASE TRY
AGAIN!":GOTO 202'EHBN
220 : REM EXEMPTIONS AND ZBA'BRHD
222 ZBA=3540:YY=2:XX=14'DQSG
224 IF N%=1 THEN C$="S":ZBA=2390:YY=1
:XX=15'HWRM
226 IF N%=2 THEN C$="MFJ"'EFEI
228 IF N%=3 THEN C$="MFS":ZBA=1770
:YY=3'GRTO
230 IF N%=4 THEN C$="HH":ZBA=2390
:YY=4'GRIH
232 IF N%=5 THEN C$="QW"'EFDF
234 PRINT:PRINT"TOTAL NUMBER OF" S$
YES'CGLJ
236 IF F=1 THEN PRINT SPC(2)
:INPUT"(FROM 1040A, LINE 5 F)
:;E%'GICP
238 IF F=2 THEN PRINT SPC(2)
:INPUT"(FROM 1040, LINE 6 F)
:;E%'GINR
240 EX=E*1040:RETURN'DJQD
300 : REM ITEMIZED DEDUCTIONS'BTWD
302 PRINT CL$:PRINT'CEFB
304 PRINT"FROM SCHEDULE A - ITEMIZED
DEDUCTIONS"'BAXL
306 FOR J=1 TO 15:PRINT CHR$(163);
:NEXT:PRINT'HNNK
308 INPUT"SUMMARY LINE 24:";D1
:D1=INT(D1+.5)'EMWO
310 PRINT"YOUR LINE 25 WAS:" ZBA'BDFD
312 D3=D1-ZBA'CHMD
314 PRINT"YOUR LINE 26 WAS:" D3
:PRINT'CDJI
316 IF D3>75 THEN INPUT"PRESS
'RETURN' TO CONTINUE";K$
:GOTO 330'FLKQ
318 IF D3<0 THEN D3=0:PRINT:PRINT L$
:GOTO 322'HOJN
320 PRINT "PROBABLY," S$ L$:PRINT'CFJD
322 PRINT SPC(6) "DO YOU WANT TO TRY
THE" S$ CH$ S$ "INSTEAD" S$;'CMYM
324 INPUT"(YES OR NO)";K$'BDWG
326 IF LEFT$(K$,1)<>"Y" THEN 330'FJGK
328 PRINT CL$:PRINT:PRINT CH$:PRINT
:GOSUB 814:D3=0:RETURN'HSAP
330 CH=0:RETURN'CECC
400 : REM TAX TABLE PARAMETERS < $50,
000'BCVF
402 F1$=STR$(A):LE=LEN(F1$)'EOGF
404 F2$=RIGHT$(F1$,2):F2=VAL(F2$)'ESSI
406 F5$=LEFT$(F1$,LE-2)'DMII
408 IF A<3000 THEN 418'DIIJ
410 IF F2<50 THEN A$=F5$+"25"'FJNE
412 IF F2=>50 THEN A$=F5$+"75"'GJNH
414 GOTO 426'BDLE
416 : REM TAX PARAMETERS < $3,000'BVXK
418 IF F2<25 THEN A$=F5$+"12.5"'FJMM
420 IF F2=>25 AND F2<50 THEN
A$=F5$+"37.5"'INCI
422 IF F2=>50 AND F2<75 THEN
A$=F5$+"62.5"'INFK
424 IF F2=>75 AND F2<99.99 THEN
A$=F5$+"87.5"'IQEN
426 A=VAL(A$):GOSUB 1002:RETURN'ELQK
500 : REM INITIALIZATION'BPPD
502 DEF FN Q(Q)=7-LEN(STR$(Q))'GKJH
504 S$=CHR$(32):CL$=CHR$(147)'EPXI
506 R$=CHR$(18):UP$=CHR$(145)'EPQL
508 B$=CHR$(146):CX$=S$+CHR$(118)
+S$'GUEP
510 CK$=S$+S$+CHR$(166)+CHR$(166)
+CHR$(166)'IWZK
512 D$=S$+CHR$(96)+CHR$(96)+CHR$(96)
'HQKK
514 F$=S$+"FORM 1040"'CESI
516 AG$="ADJUSTED GROSS INCOME"'BDCN
518 IS$="ITEMIZED (SCHEDULE A)"'BDEO
520 CH$="CHARITABLE CONTRIBUTIONS"'BD
OJ
522 SU$="SUBTRACTION"'BDOH
524 YES$="YOUR EXEMPTIONS"'BDCK
526 TA$=R$+"TAXABLE INCOME"+B$'DHGO
528 L$="YOU WOULD LOOSE BY
ITEMIZING!"'BCWS
530 L1$=S$+"CASH"'CFAP
532 L2$=S$+"NONCASH"'CFII
534 L3$=S$+"TOTAL"'CFEJ
536 L4$=S$+"DEDUCTION"'CFEN
538 L5$=CX$+"FROM TAX RATE
SCHEDULE"+S$'DINT
540 L6$=CX$+"TAX FROM TAX TABLE"'CGPK
542 RETURN'BAQF
600 : REM UNDERLINE'BKKD
602 FOR J=1 TO 39:PRINT CHR$(45);:NEXT
:PRINT:RETURN'INNJ
604 FOR J=1 TO 39:PRINT CHR$(100);
:NEXT:PRINT:RETURN'IODL
700 : REM SCHED A SUMMARY'BOIF
702 PRINT"SUMMARY LINES OF" S$ R$
"SCHEDULE A:"'BEEM
704 PRINT"YOUR LINE 24 WAS:" D1'BCAK
706 PRINT"YOUR LINE 25 WAS:" ZBA'BDFM
708 PRINT"YOUR LINE 26 WAS:" D3'BCOE
710 GOSUB 602:RETURN'CELD
800 : REM CHAR. CONTR.'BMAF
802 PRINT CL$'BDAF
804 PRINT"DID YOU MAKE" S$ R$ S$
CH$'BJAL
806 PRINT:INPUT"(YES OR NO)";Y$'CEQM
808 Y$=LEFT$(Y$,1)'CIIN

```


PROGRAMMERS' TIPS / INCOME TAX

```

810 IF Y$<>"Y" AND Y$<>"N" THEN
  PRINT"TRY AGAIN":GOTO 804'JICN
812 PRINT:IF Y$="N" THEN 846'EGLJ
814 PRINT SPC(3) L1$ S$;'CIMJ
816 IF F=1 THEN PRINT"(LINE 16A)=";
  'EDHO
818 IF F=2 THEN PRINT"(LINE 34B)=";
  'EDJQ
820 INPUT CA:CA=INT(CA+.5)'ELQJ
822 PRINT L2$ S$;'BGLH
824 IF F=1 THEN PRINT"(LINE 16B)=";
  'EDIN
826 IF F=2 THEN PRINT"(LINE 34C)=";
  'EDKP
828 INPUT CO:CO=INT(CO+.5)'ELHR
830 CT=CA+CO'CGJI
832 CH=INT(.5+CT/2)'EJWL
834 PRINT:IF CH>74 THEN 846'EICN
836 PRINT:PRINT"THIS IS A RATHER LOW
  DEDUCTION OF $"CH'CDYW
838 PRINT:PRINT"DO YOU WANT TO
  RECONSIDER"CBQV
840 INPUT"(YES OR NO)";Y$'BDGK
842 Y$=LEFT$(Y$,1)'CIIL
844 IF Y$="Y" THEN PRINT:GOTO 814'FGEO
846 YY$="N":RETURN'CEIO
900 : REM PRINTER VIC-1525'BQAH
902 PRINT"DO YOU WANT A PRINT-OUT (Y
  OR N)""BAGN
904 GET PR$:IF PR$="" THEN 904'EKGL
906 PRINT UP$;:FOR J=1 TO 39:PRINT S$;
  :NEXT J'GPGQ
908 IF PR$<>"Y" THEN 192'EGGP
910 PRINT SPC(14) UP$ "PRINTING"CGJJ
912 OPEN 4,4:CMD 4:GOTO 102'DJWJ
1000 : REM TAX CALCULATION'BPDW
1002 IF A<=A(1) THEN TX=0:RETURN'GJPA
1004 FOR X=1 TO XX'DEQA
1006 IF A>A(X) THEN R=R%(X):T=T(X)
  :DA=A-A(X)'HAGJ
1008 NEXT X'BBRB
1010 TX=INT((T+DA*R/100)+.5)
  :RETURN'HQWC
1100 : REM SELECT DATA'BLMW
1102 DIM A(15), T(15), R%(15)'BSPA
1104 PRINT:FOR Y=1 TO YY
  :PRINT SPC(24) Y'GKUE
1106 FOR X=1 TO 15:READ A(X):S=S+A(X)
  :NEXT X'HSUI
1108 FOR X=1 TO 15:READ T(X):S=S+T(X)
  :NEXT X'HSIK
1110 FOR X=1 TO 15:READ R%(X)
  :S=S+R%(X):NEXT X'HUXE
1112 GOSUB 1202:S=0:NEXT Y:RETURN'EKHB
1200 : REM CHECK DATA'BKX
1202 IF INT(S)=446714 THEN RETURN'FJFC
1204 IF INT(S)=590158 THEN RETURN'FJHE
1206 IF INT(S)=820712 THEN RETURN'FJEF
1208 IF INT(S)=410571 THEN RETURN'FJCH
1210 PRINT:PRINT"STOP! DATA ENTRY
  ERROR IN LINES"CBLF
1212 SS=1000*(Y+1)'DKXC
1214 PRINT SS "TO" SS+10:STOP'DHTE

2000 : REM IRS SCHED X: SINGLE
  TAXPAYERS (S)'BEOC
2002 DATA 2390, 3540, 4580, 6760,
  8850, 11240, 13430, 15610'BRKE
2004 DATA 18940, 24460, 29970, 35490,
  43190, 57550, 85130'BQSG
2006 DATA 0, 126.5, 251.3, 556.5, 870,
  1252.4, 1646.6, 2082.6,
  2848.5'BBPK
2008 DATA 4283.7, 5936.7, 7813.5,
  10739.5, 16770.7, 30009.1'BTAL
2010 DATA 11,12,14,15,16,18,20,23,26,
  30,34,38,42,48,50'BTED
3000 : REM IRS SCHED Y: MARRIED
  FILING JOINTLY(MFJ)'BLVF
3001 : REM AND QUALIFYING
  WIDOW(ER)S(QW)'BDHE
3002 DATA 3540, 5720, 7910, 12390,
  16650, 21020, 25600, 31120'BTMG
3004 DATA 36630, 47670, 62450, 89090,
  113860, 169020, 9'BOLH
3006 DATA 0, 239.8, 502.6, 1129.8,
  1811.4, 2598, 3605.6,
  4985.6'BVQK
3008 DATA 6528.4, 10171.6, 15788,
  26976.8, 38123.3, 65151.7,
  9'BVMM
3010 DATA 11,12,14,16,18,22,25,28,33,
  38,42,45,49,50,9'BSVE
4000 : REM IRS SCHED Y: MARRIED
  FILING SEPARATE RETURNS
  (MFS)'BTTJ
4002 DATA 1770, 2860, 3955, 6195,
  8325, 10510, 12800, 15560'BRWG
4004 DATA 18315, 23835, 31225, 44545,
  56930, 84510, 9'BMOH
4006 DATA 0, 119.9, 251.3, 564.9,
  905.7, 1299, 1802.8, 2492.8'BTOL
4008 DATA 3264.2, 5085.8, 7894,
  13488.4, 19061.65, 32575.85,
  9'BVVN
4010 DATA 11,12,14,16,18,22,25,28,33,
  38,42,45,49,50,9'BSVF
5000 : REM IRS SCHED Z: UNMARRIED
  HEADS OF HOUSEHOLD (HH)'BPWI
5002 DATA 2390, 4580, 6760, 9050,
  12280, 15610, 18940, 24460'BSVH
5004 DATA 29970, 35490, 46520, 63070,
  85130, 112720, 9'BNDJ
5006 DATA 0, 240.9, 502.5, 823.1,
  1372.2, 1971.6, 2637.6,
  3962.4'BWSM
5008 DATA 5505.2, 7271.6, 11132.1,
  18083.1, 28010.1, 41253.3,
  9'BWFO
5010 DATA 11,12,14,17,18,20,24,28,32,
  35,42,45,48,50,9'BSOG
6000 : REM FLAG'BFBY
6002 PRINT:PRINT"SORRY,
  YOU MUST USE FORM 1040.
  YOUR"CBNK
6004 PRINT"TAXABLE INCOME OF $" TA
  "IS TOO HIGH!":END'CDDL

```

END

"Life" in the Fast Lane for the Commodore 64

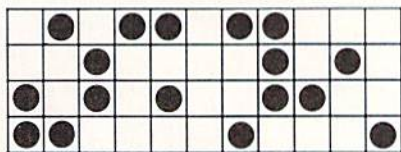
The Game of Life" by Cyndie Merten appeared in the May/June 1985 issue of Commodore Microcomputers. The game simulates the rise and decline of generations of organisms in a population, based on just three rules:

1. Any organism surrounded by two or three neighboring organisms survives.
2. Four or more neighbors dooms an organism because of overpopulation. Conversely, having no neighbors leads to death from isolation.
3. An empty space (cell) with exactly three neighboring organisms has an organism born to it.

The result, over generations of organisms, is a series of complex, ever-changing patterns that are both aesthetically and mathematically intriguing.

After playing Cyndie Merten's Game of Life for some time, it became clear that if I wanted to explore the game in greater detail, it would be necessary to speed up the program. If the game could be played faster, it would be possible to follow the evolution of more patterns for more generations. I, therefore, modified Cyndie's program for the 64. Because I replaced BASIC programming with ma-

Speed up the "Game of Life" from our May/June 1985 issue, so it runs 100 times faster.



chine language in several places, the game runs more than 100 times faster than the original program. You may find it interesting to see the game patterns move across the screen at this rate.

While speeding up the program, I also added a few features and options that may be of interest to others experimenting with Life. First, since the revised program runs so quickly, I included line 240 as a sort of throttle. You can adjust the speed of the program to your liking by adjusting the ending value for this FOR-NEXT loop. Next, I provide the means to stop and then continue the evolution of a pattern. Line 250 will halt the program when the space bar is pressed. Line 260 will restart the evolution where it left off when the RETURN key is hit. This feature allows you to examine a particular pattern at length without disturbing its subsequent evolution. You can even "single-step" through an evolution in order to study the changes in a pattern in great detail. If you are a speed demon, you may delete lines 240-260 to make the pro-

gram run all out.

The final option I added is a choice in the type of board that Life is to be played on. The program listed below plays on a finite board with boundaries at the edge of the computer screen. By adding the line

230 SYS 49452

you change the board to one with no boundaries. The screen wraps from top to bottom and left to right as if there were no break at the edge of the screen. For example, a pattern that evolves off the top of the screen will continue without distortion onto the bottom of the screen. With this choice you are playing Life on the surface of a torus, or donut shape!

To play Life, simply load and run the program. The screen will go black and a flashing cursor (ball) will appear. To enter your starting pattern, use the cursor keys to position this cursor, and then use the asterisk key to turn on cells. The space bar may be used to erase cells that are on. When the pattern is set, hit the RETURN key to begin its evolution. Remember, you may pause during this evolution by hitting the space bar and restart it with the RETURN key. To end the evolution of a pattern, hit RUN/STOP. You may then simply RUN the program to play again.

There is a lot to like about Life: the beautiful, evolving patterns that flicker across the computer screen and the challenge of designing new patterns and understanding how they will evolve create a fascinating study for the mathematically minded. For readers whose interest in Life was kindled by Cyndie Merten's article, I think this program will provide a powerful new tool for exploring this game.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program."

Fast Life

```
10 W=51968:C=55296:POKE 53280,0
   :POKE 53281,0'EEYF
20 IF PEEK(49152)<>169 OR
   PEEK(49580)<>96 THEN GOSUB 300'KWOJ
30 SYS 49397:K=0:S=0'DLGD
40 GET A$:IF A$="" THEN A=PEEK(C+K)
   :POKE C+K,NOT(A AND 1) AND (A OR
   1)'NWEN
50 IF A$=CHR$(42) THEN S=1:D=1
   :GOSUB 150'HPLI
```

```
60 IF A$=CHR$(13) THEN POKE C+K,S
   :GOTO 210'HOEJ
70 IF A$=CHR$(29) THEN D=1
   :GOSUB 150'GMEJ
80 IF A$=CHR$(157) THEN D=-1
   :GOSUB 150'HNTL
90 IF A$=CHR$(17) THEN D=40
   :GOSUB 150'GNCL
100 IF A$=CHR$(145) THEN D=-40
   :GOSUB 150'HORC
110 IF A$=CHR$(32) THEN S=0:D=1
   :GOSUB 150'HPJD
120 GOTO 40'BCLW
150 POKE C+K,S:K=K+D:IF K>999 OR K<0
```


PROGRAMMERS' TIPS / LIFE

```

    THEN K=K-D'LSEL
160 S=PEEK(C+K):RETURN'EGYF
210 SYS 49250'BFLX
220 SYS 49152'BFLY
240 FOR I=0 TO 100:NEXT'EGGD
250 GET AS:IF AS<>CHR$(32) THEN
270'GMFH
260 GET AS:IF AS<>CHR$(13) THEN
260'GMDI
270 SYS 49298:GOTO 210'CJEG
297 REM *'BBJM
298 REM * SUBROUTINE TO LOAD ML *'BUDT
299 REM *'BBJO
300 PRINT"[CLEAR,DOWN5,RIGHT8]
    LOADING MACHINE LANGUAGE"BAVF
310 FOR K=49152 TO 49580:READ M
    :POKE K,M:NEXT:RETURN'HTMG
997 REM *'BBJT
998 REM * DATA FOR ML ROUTINES *'BTUA
999 REM *'BBJV
1000 DATA 169,39,133,253,169,0,133,
    254'BDUX
1010 DATA 169,216,133,255,169,0,141,
    36'BDQY
1020 DATA 192,169,203,141,37,192,160,
    0'BDJA
1030 DATA 177,254,41,15,240,11,160,
    7'BBEB
1040 DATA 190,90,192,254,26,207,136,
    16'BDRC
1050 DATA 247,238,36,192,208,3,238,
    37'BCBD
1060 DATA 192,198,253,16,18,169,39,
    133'BDCE
1070 DATA 253,24,173,36,192,105,2,
    141'BCFF
1080 DATA 36,192,144,3,238,37,192,
    230'BCQG
1090 DATA 254,208,2,230,255,165,254,
    201'BEZI
1100 DATA 232,208,195,165,255,201,219,
    208'BGKA
1110 DATA 189,96,0,1,2,42,44,84'BVXY
1120 DATA 85,86,169,0,141,111,192,
    169'BCXB
1130 DATA 203,141,112,192,162,0,142,
    110'BEED
1140 DATA 207,238,111,192,208,3,238,
    112'BEAE
1150 DATA 192,173,111,192,201,110,208,
    238'BGUF
1160 DATA 173,112,192,201,207,208,231,
    165'BGVG
1170 DATA 251,201,15,208,2,134,251,
    230'BDQG
1180 DATA 251,96,169,39,133,253,169,
    0'BCCH
1190 DATA 133,254,169,216,133,255,169,
    43'BFQJ
1200 DATA 141,171,192,169,203,141,172,
    192'BGFB
1210 DATA 160,0,173,69,207,201,2,
    240'BBXB
1220 DATA 19,201,3,208,12,177,254,
    41'BBFC
1230 DATA 15,208,9,165,251,145,254,
    208'BDRD
1240 DATA 3,152,145,254,238,171,192,
    208'BEJF
1250 DATA 3,238,172,192,198,253,16,
    18'BCAF
1260 DATA 169,39,133,253,24,173,171,
    192'BEQH
1270 DATA 105,2,141,171,192,144,3,
    238'BCDH
1280 DATA 172,192,230,254,208,2,230,
    255'BEAJ
1290 DATA 165,254,201,232,208,188,165,
    255'BGNK
1300 DATA 201,219,208,182,96,169,0,
    133'BDPB
1310 DATA 254,169,216,133,255,169,0,
    133'BELE
1320 DATA 252,169,4,133,253,160,0,
    169'BCMD
1330 DATA 0,145,254,169,81,145,252,
    230'BDLE
1340 DATA 252,208,2,230,253,230,254,
    208'BEVG
1350 DATA 2,230,255,165,254,201,232,
    208'BEVH
1360 DATA 230,165,255,201,219,208,224,
    169'BGHI
1370 DATA 1,133,251,96,160,1,24,
    185'BAGI
1380 DATA 0,203,121,26,207,153,26,
    207'BCUJ
1390 DATA 24,185,68,207,121,42,203,
    153'BDIK
1400 DATA 42,203,200,192,41,208,231,
    169'BEVD
1410 DATA 25,133,253,169,42,133,254,
    169'BENE
1420 DATA 203,133,255,160,0,24,177,
    254'BDEE
1430 DATA 160,40,113,254,145,254,160,
    41'BETG
1440 DATA 24,177,254,160,1,113,254,
    145'BDHG
1450 DATA 254,24,165,254,105,42,133,
    254'BEDI
1460 DATA 144,2,230,255,198,253,208,
    219'BELJ
1470 DATA 24,173,0,203,160,40,121,
    26'BBPJ
1480 DATA 207,153,26,207,160,41,24,
    185'BDIK
1490 DATA 0,203,160,1,121,26,207,
    153'BBNL
1500 DATA 26,207,24,173,68,207,160,
    40'BCLD
1510 DATA 121,42,203,153,42,203,160,
    41'BDNE
1520 DATA 24,185,68,207,160,1,121,
    42'BBGF
1530 DATA 203,153,42,203,96'BRCE

```

END

Multicolor Pie Graphs

for the Commodore
128, Plus/4,
Commodore 16

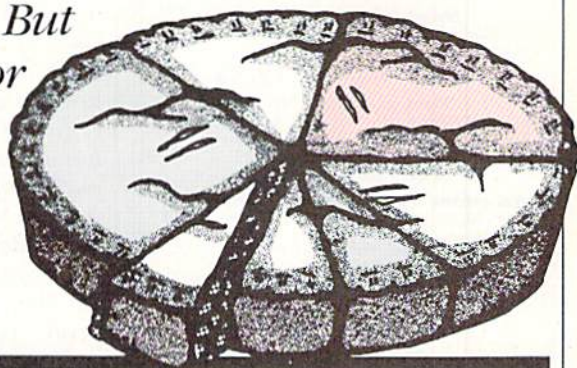
One of the outstanding features of the new BASIC versions used by the Commodore 128, Plus/4 and Commodore 16 computers is their graphics capabilities. In this article, we use some of these powerful commands to draw pie graphs. A pie graph (or circle graph) shows the relative sizes of various pieces of some whole. The program in this article can be used to display many types of data in the form of pie graphs.

A pie graph can be used, for example, to show how your monthly income is spent. The whole pie represents your total income for the month. Each slice represents the amount spent on one item. For example, suppose you make \$400 in a month, and your expenses are:

Rent \$100
Food \$48
Computer Games \$80
Taxes \$100
Dog \$72

Your rent of \$100 is one fourth (or

Drawing pie graphs on a Commodore 64 or VIC 20 requires detailed machine-level knowledge. But with BASIC 3.5 or 7.0, such tasks are accessible to programmers at all levels.



25%) of your total income of \$400. So, on the pie graph, the slice that represents your rent is 25% of the pie. To draw the pie graph by hand, you would need to calculate the percentage for each category and convert it into a slice.

This program draws the pie graph based on the numbers you enter. When you run the program, it first asks for a title for the graph. Then you enter the number of slices in your pie (NUMBER OF DIVISIONS). The program can handle up to ten slices. In the preceding example, there are five. For each of the slices, you enter the amount of the expense (AMOUNT IN DIVISION), and the name of the expense (TITLE FOR DIVISION). The in-

put for the example looks like this:

```
TITLE OF PIE GRAPH? EXPENSES
NUMBER OF DIVISIONS? 5
AMOUNT IN DIVISION 1? 100
TITLE FOR DIVISION 1? RENT
AMOUNT IN DIVISION 2? 48
TITLE FOR DIVISION 2? FOOD
AMOUNT IN DIVISION 3? 80
TITLE FOR DIVISION 3? GAMES
AMOUNT IN DIVISION 4? 100
TITLE FOR DIVISION 4? TAXES
AMOUNT IN DIVISION 5? 72
TITLE FOR DIVISION 5? DOG
```

The legend beneath the graph is color-coded to match the appropriate slices and shows the percentage calculated for each slice. When you finish viewing the graph, press any key to return to BASIC.

Continued

Before typing this program, read "How to Enter Programs."

Multicolor Pie Graphs

```
10 DIM P(10), TS$(10)
20 GRAPHIC 4,1
30 COLOR 3,1,0
40 PRINT "TITLE OF PIE GRAPH";:INPUT TS$
50 TS$=LEFT$(TS$,40):X=20-LEN(TS$)/2
60 CHAR 3,X,2,TS$
70 PRINT "NUMBER OF DIVISIONS";:INPUT N
80 IF N>10 OR N<1 THEN 70
90 T=0:FOR I=1 TO N
100 PRINT "AMOUNT IN DIVISION";I;
:INPUT P(I):IF P(I)<0 THEN 100
110 PRINT "TITLE FOR DIVISION";I;
:INPUT TS$(I)
120 TS$(I)=LEFT$(TS$(I)+"[SPACE10]",
10)
130 T=T+P(I):NEXT
140 FOR I=1 TO N:P(I)=(P(I)/T)*360
:NEXT
150 GRAPHIC 3:CX=1:CY=20
160 X1=75:Y1=31
```

```
170 C=1
180 DRAW 3,75,87 TO X1,Y1
190 A=0:FOR I=1 TO N
200 CIRCLE 3,75,87,28,56,A,A+P(I)
210 X=RDOT(0):Y=RDOT(1)
220 DRAW 3,75,87 TO X,Y
230 C=(C OR 3)AND NOT(C AND 3)
240 COLOR C,I+1,5
250 XM=X1+(X-X1)/2:YM=Y1+(Y-Y1)/2
:XM=(XM-75)/2:YM=(YM-87)/2
260 IF P(I)<=180 THEN XM=75+XM
:YM=87+YM
270 IF P(I)>180 THEN XM=75-XM:YM=87-YM
280 PAINT C,XM,YM,1
290 BOX C,CX*4,CY*8,CX*4+3,CY*8+7,,1
300 CHAR 3,CX+2,CY,TS$(I)+LEFT$(STR$
(P(I)*100/360),4)+"%"
310 CY=CY+1:IF CY>24 THEN CY=20:CX=21
320 A=A+P(I)
330 X1=X:Y1=Y
340 NEXT
350 GET KEY K$:GRAPHIC 0:COLOR 1,1,0
```

END

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PROGRAMMERS' TIPS

The Program

Multicolor graphics mode is used to draw the pie graph. In high-resolution mode, the outline could be drawn, but it would be impossible to give each slice its own color. A split screen is used to allow room for user input below the graphing area. More information on all the graphics modes can be found in *The Programmer's Reference Guide for the Commodore Plus/4* by C. Merten and S. Meyer, and *The Programmer's Reference Guide for the Commodore 16* by S. Meyer and C. Merten. Both are published by Scott, Foresman and Co. Also see Commodore's *Commodore 128 Programmer's Reference Guide*.

The program is divided into several sections. Lines 10-30 dimension arrays, enter multicolor split-screen mode, and set up the color for the pie-graph outline. The user input is accepted in lines 40-130. Lines 140-190 prepare to draw the graph and the legend. For each slice, lines 200-220 draw the outline, and lines 230-280 fill in the color. The legend is written in lines 290 and 300, and then lines 310-340 set up for the next slice.

To ensure that the title fits on one line, the first statement in line 50 allows only the first 40 characters to be used. The second statement calculates the starting position for the line so that it is centered on the screen. Error checking is performed in lines 80 and 100. Line 120 makes the name of the slice exactly ten characters long, by either adding spaces or deleting extra characters.

The numbers input for each slice are added to get the total for the pie in line 130. Then, in line 140 the proportion for each slice is calculated. The proportion is multiplied by the 360 degrees of a circle to get the number of degrees in the slice.

Line 150 enters full-screen multicolor mode and sets up the coordinates to be used for the legend at the bottom of the graph. An arc is drawn for each slice. The coordinates of the point for the beginning of the first arc are set to the top of the circle, directly above its center, in line 160. The color source for PAINTing is initialized to 1 (foreground) in line 170.

Line 180 draws the first division


line between the center of the circle and the top of the circle. The beginning angle for the first arc is set to zero in line 190. This line also starts the FOR-NEXT loop that draws each slice.

To begin drawing a slice, line 200 draws an arc. Each arc starts at the end of the previous arc and continues for the number of degrees in the slice. Line 210 retrieves the ending coordinates of the arc. Line 220 draws a division line between the center of the circle and the end of this arc, which completes the outline for this slice.

In line 230, the color source used to PAINT a slice is alternated between 1 and 2. This is done to help minimize the amount of "bleeding" between divisions. In line 240, the color to be used for the current slice is set.

Coordinates of a point inside the slice must accompany the PAINT command. Lines 250 through 270 calculate the coordinates of such a point. First the midpoint of the line that connects the two ends of the arc is found. Then the midpoint of the line between that point and the center is found. This point is usable when the number of degrees in the slice is less than 180. However, if the number of degrees is greater than 180, the opposite point must be used. The division lines and arc are the boundaries for the PAINT command in line 280. Sometimes the PAINT coordinates fall directly on one of the division lines, and the slice is not colored in. This happens when a slice is either half the pie, or very small.

Line 290 draws a colored BOX in the same color as the slice. Line 300 plots the name of this slice and the percentage of the pie contained in it. Line 310 sets the coordinates of the legend entry for the next slice. Line 320 sets the starting angle for the next arc, and line 330 saves the endpoint coordinates of the current arc as the starting coordinates of the next arc. Then line 340 begins the next slice. The pie graph is now complete. When you are finished looking at it, press a key, and line 350 returns you to standard text mode.

Drawing pie graphs on a Commodore 64 or VIC 20 requires detailed machine-level knowledge. But with BASIC 3.5 or 7.0, such tasks are accessible to programmers at all levels. 

DISCOVERY LEARNING

Continued from pg. 69

that were designed to help develop reading skills: "Utah" and "Broadway" (the first deals with animal names and the second with transportation).

I would like to emphasize here that the sky is the limit. However, most parents/teachers will probably want to stick to the typical preschool curriculum areas. For example, you might want to teach simple counting from 1 to 20. Or you might be interested in helping your child learn to recognize all their letters, which is why the "Utah" and "Broadway" microworlds were developed using rather long names with uncommon letters.

You could also develop a microworld where children could learn about classes of words such as nouns, verbs, and adjectives. Microworlds could teach body parts, properties of four-dimensional space (up, down, right, left), kinds of transportation, and classes of animals. The only limitation is your imagination.

Third, draw the background for your microworld. This is important, as it lends realism to the world you are constructing. On page A-66 of the LOGO manual, there is a nifty little drawing program that uses the turtle and some single-key commands to draw. It is very fast and a lot of fun! You will need to type it in and save it to use it again and again.

Fourth, begin designing and saving your sprite shapes (the most time-consuming part) with the sprite editor. Essentially you will be filling in blocks on an imaginary piece of computer graph paper—not a very difficult task. Commodore's LOGO for the 64 allows you to create seven sprites that conform to just about any shape you desire. Our microworlds have dolphins, horses, trucks, planes, butterflies, and sailing ships.

Fifth, write the other programs necessary to orient each sprite to the screen, give it a heading, velocity, color, and so on. Finally, save all the necessary procedures together under one self-starting procedure name (see the LOGO manual, page A-122) so your child can start up the microworld by typing in one simple command (READ "UTAH"). Later on you can go back and add color to the background, learn how to use the turtle for an eighth sprite, and even add

music to liven things up.

Lawler added the ability to control sprites individually by typing in commands like UP and DOWN, which allowed his daughter to make Beachworld different every time. In my simplified versions, when a sprite's name is typed, it appears and moves off in a preset heading and velocity. Our sprites continue this way for as long as the program is running. The end result in "Broadway," for example, is a bustling two-way thoroughfare lined by tall buildings. There are all sorts of wheeled vehicles (car, truck, bike), air vehicles (airplane, balloon), and even a couple of water vehicles (sailing ship and submarine) just for fun. The easiest way to use "Broadway" is to give the child cue cards with the vehicle names on them, so they can use these to find the letters on the keyboard.

Microcomputers as learning tools are unique because they allow a type of discovery learning that young children usually cannot experience elsewhere. They can be used to support young children's built-in exploratory/investigative nature, chiefly through the creation of microworlds, where children can explore, exercise freedom of choice, and have control over activities, albeit within determined boundaries.

You might think of these microworlds as electronic sandboxes or blocks that have been tailor-made to fit a specific content area. They are intrinsically of interest to young children because they offer an open door to discovery; something no child can resist. They are motivating to young children because they offer freedom and control. They are good for young children because they contain the conceptual mortar for intellectual masonry that will be invaluable to them later. They are better for young children than drill-and-practice or video games because they offer more than correct answers or enhanced eye-hand coordination. Finally, they are relevant because they make good the microcomputer's promise to revolutionize personal education.

Daniel D. Shade is professor of child development at Southeast Missouri State University in Cape Girardeau, Missouri.

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Commodore user groups nationwide and around the world provide invaluable assistance to Commodore computerists. If you are looking for people who share your computing interests, or if you need help getting started with your computer, contact the group near you.

This list is compiled from groups who responded to a survey conducted by Pete Baczor, Commodore's user group coordinator. If you would like your group to appear here, or if you need information about Commodore's user group support, contact Pete at Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380.

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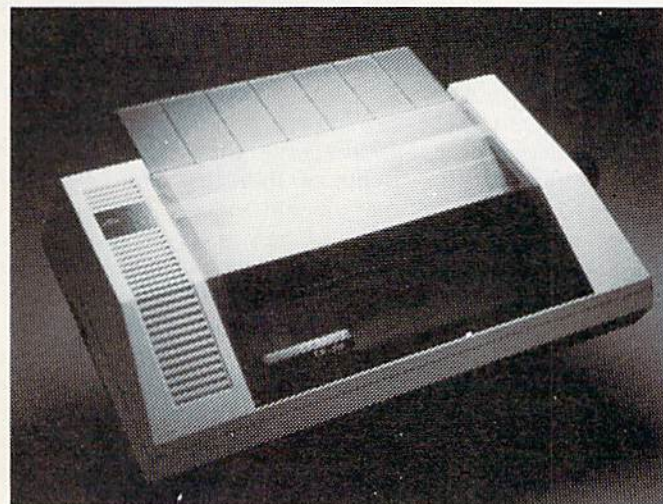
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LCP PROJECT

Continued from pg. 26

water run out. He began to look very, very sad, and finally he turned green. We originally had planned to hold out until he became so sick that he went to bed—but Susanne couldn't stand to see him in this pitiful condition. She broke down and gave him food and water within minutes after his face changed color. So much for Science.

I could tell you much more about Thomas' quirks and habits, but that would take a lot of the fun out of conducting your own research project. After all, the thrill of discovery is what this program is all about. There are no high scores, no eye-hand coordination skills, no chills, no spills, no deaths, no explosions. Just a funny Little Computer Person going about his life, every once in a while looking right at you and saying something in a strange language, or asking you to play a game with him, or typing you a letter about how he sees things from his side of the screen.

As fascinating as my daughter and I found this project, I suspect it's not for everybody. An acquaintance who has two young boys, for instance, says they found working with their LCP very boring. But I think if you're the type of person who likes to observe ant farms or who enjoys doll house fantasies, you'll thoroughly enjoy observing and caring for a Little Computer Person. As time goes on, you begin to learn the nuances of your LCP's personality. And suddenly, after hours of observation, just as you're beginning to think you've learned everything about him, maybe he'll do something completely new. In our case, for example, it came as a shock one evening when Thomas went up to the bathroom and brushed his teeth after he had eaten. He'd never done that before. He has not yet, however, taken a shower—at least not to our knowledge.

The *Little Computer People Project* is one of a group of non-competitive games from Activision that have great appeal to certain types of people. The point of these games is to involve and interest the player in simply *participating* in the game, rather than in *winning* something. It's a unique concept, especially in our competitive society, and works especially well in this particular piece of software. **C**

QUEST OF THE AVATAR

Continued from pg. 22

lished conventions in another significant manner. Though your party may consist of up to eight characters, you can't simply create and name them using the usual method of character generation. Instead, you have to ask people to join the quest. Until you've achieved a high rating in that person's virtue, he or she will never enlist. And you'll need a full party of eight, plus red and purple stones, candles, and other trinkets in order to survive a trip to the Stygian Abyss.

The most entertaining—and radical—departure from tradition is *Avatar's* emphasis on character interaction, made possible by a mini-parser that accepts one-word statements. When talking to someone, you can ask things such as "name" or "job." Many will converse at length, and if you repeat the right word in the reply, may reveal more information on the topic. A Bard might refer you to another character, who gives directions to the local shrine or a rune. Half the fun of *Avatar* is running around and talking to the 256 people in the villages and towns of Britannia, where this saga unfolds.

Sightseeing in Britannia

Afloat in an ocean sprinkled with uncharted islands, *Ultima IV's* world, Britannia, is a sprawling continent on a planet sixteen times bigger than *Ultima III's* Sosaria. A summary of the land's general geography is laid out in the 36-page *History of Britannia*; the place names can be matched up with those on the cloth map. Moon gates are still available for teleportation, and this time the documentation spells out precisely how to manipulate them. There's one new mode of transportation—hot air balloons. After sailing, teleporting and ballooning about the surface, you'll want to go underground and explore the animated 3-D dungeons, which now contain rooms like those in the towns.

Wherever you wander, orc slaying and treasure-chest grabbing are still on the itinerary. Combat occurs in an arena similar to that of *Ultima III*, but the layout varies according to the immediate terrain. You must maneuver your crew members, shown individually in battle, to take best advantage of the terrain. Battle reports sum up the degree of damage of each blow

you inflict: lightly wounded, missed, critically wounded, and so on. The most welcome change enables you to flee the arena if the going gets rough. For this reason, new characters won't get wiped out as frequently. And when your hit points are running low, you can camp out and sleep to restore them.

The magic system has been upgraded for realism. You can't buy any of the 26 magic spells—only ingredients for them, like spider silk, mandrake root and ginseng. To prepare a spell, the correct ingredients must be blended according to formulae in the 62-page magic manual. Styled after the methods of medieval alchemists, this process is more authentic than most magic systems. In addition to spells, you can also invoke four kinds of energy fields that will affect anyone who walks through them.

A Streamlined Interface

Ultima IV employs the same single-keystroke command interface for moving and giving other orders as the previous *Ultima* games, but game-play mechanics have been streamlined for convenience. Your character holds all the gold and does all the talking, so you never have to swap money back and forth or indicate who is speaking. Weapons, armor and herbs are also pooled; so is food, which lasts longer than in other *Ultimas*. And, besides promoting you up to the next level, Lord British will now dole out advice in his two-story castle.

Sailing is executed more realistically (you must master the technique of tacking), and the three levels of water depth are indicated with different animation and colors. The ship pivots about when you change direction, kids wave at you, a bull stomps the ground with his foot—these are but a few of the intricately detailed examples of animation that enliven your quest. The sound effects in battle and music that accompanies many scenes lends even more atmosphere to the drama.

A two-disk game, *Avatar* is easily the most engaging of Garriott's work. Not as hard as *Ultima II*, with those convoluted time doors, but tougher and more involved than *III*, this one should provide 100-200 hours of uncommon fun for adventurers who want to explore the newest dimension in fantasy role-playing. **C**

HOW TO ENTER PROGRAMS

The programs which appear in this magazine have been run, tested and checked for bugs and errors. After a program is tested, it is printed on a letter quality printer with some formatting changes. This listing is then photographed directly and printed in the magazine. Using this method ensures the most error-free program listings possible.

Whenever you see a word inside brackets, such as [DOWN], the word represents a keystroke or series of keystrokes on the keyboard. The word [DOWN] would be entered by pressing the cursor-down key. If multiple keystrokes are required, the number will directly follow the word. For example, [DOWN4] would mean to press the cursor-down key four times. If there are multiple words within one set of brackets, enter the keystrokes directly after one another. For example, [DOWN, RIGHT 2] would mean to press the cursor-down key once and then the cursor-right key twice.

In addition to these graphic symbols, the keyboard graphics are all represented by a word and a letter. The word is either SHFT or CMD and represents the SHIFT key or the Commodore key. The letter is one of the letters on the keyboard. The combination [SHFT E] would be entered by holding down the SHIFT key and pressing the E. A number following the letter tells you how many times to type the letter. For example, [SHFT A4,CMD B3] would mean to hold the SHIFT key and press the A four times, then hold down the Commodore key and press the B three times.

The chart on this page tells you the keys to press for any word or words inside brackets. Refer to this chart whenever you aren't sure what keys to press. The little graphic next to each keystroke shows you what you will see on the screen.

SYNTAX ERROR

This is by far the most common error encountered while entering a program. Usually (sorry folks) this means that you have typed something incorrectly on the line the syntax error refers to. If you get the message "Syntax Error Break In Line 270", type LIST 270 and press RE-

TURN. This will list line 270 to the screen. Look for any non-obvious mistakes like a zero in place of an O or vice-versa. Check for semicolons and colons reversed and extra or missing parenthesis. All of these things will cause a syntax error.

There is only one time a syntax error will tell you the 'wrong' line to look at. If the line the syntax error refers to has a function call (i.e., FN A(3)), the syntax error may be in the line that defines the function, rather than the line named in the error message. Look for a line near the beginning of the program (usually) that has DEF FN A(X) in it with an equation following it. Look for a typo in the equation part of this definition.

ILLEGAL QUANTITY ERROR

This is another common error message. This can also be caused by a typing error, but it is a little harder to find. Once again, list the line number that the error message refers to. There is probably a poke statement on this line. If there is, then the error is referring to what is trying to be poked. A number must be in the range of zero to 255 to be poke-able. For example, the statement POKE 1024,260 would produce an illegal quantity error because 260 is greater than 255.

Most often, the value being poked is a variable (A,X,...). This error is telling you that this variable is out of range. If the variable is being read

from data statements, then the problem is somewhere in the data statements. Check the data statements for missing commas or other typos.

If the variable is not coming from data statements, then the problem will be a little harder to find. Check each line that contains the variable for typing mistakes.




































OUT OF DATA ERROR

This error message is always related to the data statements in a program. If this error occurs, it means that the program has run out of data items before it was supposed to. It is usually caused by a problem or typo in the data statements. Check first to see if you have left out a whole line of data. Next, check for missing commas between numbers. Reading data from a page of a magazine can be a strain on the brain, so use a ruler or a piece of paper or anything else to help you keep track of where you are as you enter the data.

OTHER PROBLEMS

It is important to remember that the 64 and the PET/CBM computers will only accept a line up to 80 characters long. The VIC 20 will accept a line up to 88 characters long. Sometimes you will find a line in a program that runs over this number of characters. This is not a mistake in the listing. Sometimes programmers get so carried away crunching programs that they use abbreviated commands to get more than 80 (or 88)

CHART OF SPECIAL CHARACTER COMMANDS

 "[HOME]" = UNSHIFTED CLR/ HOME	 "[PURPLE]" = CONTROL 5	 "[F1]" = F1
 "[CLEAR]" = SHIFTED CLR/HOME	 "[GREEN]" = CONTROL 6	 "[F2]" = F2
 "[DOWN]" = CURSOR DOWN	 "[BLUE]" = CONTROL 7	 "[F3]" = F3
 "[UP]" = CURSOR UP	 "[YELLOW]" = CONTROL 8	 "[F4]" = F4
 "[RIGHT]" = CURSOR RIGHT	 "[ORANGE]" = COMMODORE 1	 "[F5]" = F5
 "[LEFT]" = CURSOR LEFT	 "[BROWN]" = COMMODORE 2	 "[F6]" = F6
 "[RVS]" = CONTROL 9	 "[L. RED]" = COMMODORE 3	 "[F7]" = F7
 "[RVOFF]" = CONTROL 0	 "[GRAY1]" = COMMODORE 4	 "[F8]" = F8
 "[BLACK]" = CONTROL 1	 "[GRAY2]" = COMMODORE 5	 "[POUND]" = ENGLISH POUND
 "[WHITE]" = CONTROL 2	 "[L. GREEN]" = COMMODORE 6	 "[SHFT ^]" = PI SYMBOL
 "[RED]" = CONTROL 3	 "[L. BLUE]" = COMMODORE 7	 "[I ^]" = UP ARROW
 "[CYAN]" = CONTROL 4	 "[GRAY3]" = COMMODORE 8	

GRAPHIC SYMBOLS WILL BE REPRESENTED AS EITHER THE LETTERS SHFT (SHIFT) AND A KEY ("[SHFT Q,SHFT J,SHFT D,SHFT S]") OR THE LETTERS CMDR (COMMODORE) AND A KEY ("[CMDR Q,CMDR G,CMDR Y,CMDR H]"). IF A SYMBOL IS REPEATED, THE NUMBER OF REPETITIONS WILL BE DIRECTLY AFTER THE KEY AND BEFORE THE COMMA ("[SPACE3,SHFT S4,CMDR M2]").

characters on one line. You can enter these lines by abbreviating the commands when you enter the line. The abbreviations for BASIC commands are on pages 133-134 of the VIC 20 user guide and 130-131 of the Commodore 64 user's guide.

If you type a line that is longer than 80 (or 88) characters, the computer will act as if everything is ok, until you press RETURN. Then, a syntax error will be displayed.

THE PROGRAM WON'T RUN!!

This is the hardest of problems to resolve; no error message is displayed, but the program just doesn't run. This can be caused by many small mistakes typing a program in. First check that the program was written for the computer you are using. Check to see if you have left out any lines of the program. Check each line of the program for typos or missing parts. Finally, press the RUN/STOP key while the program is 'running'. Write down the line the program broke at and try to follow the program backwards from this point, looking for problems.

IF ALL ELSE FAILS

You've come to the end of your rope. You can't get the program to run and you can't find any errors in your typing. What do you do? As always, we suggest that you try a local user group for help. In a group of even just a dozen members, someone is bound to have typed in the same program.

If you do get a working copy, be sure to compare it to your own version so that you can learn from your errors and increase your understanding of programming.

If you live in the country, don't have a local user group, or you simply can't get any help, write to us. If you do write to us, include the following information about the program you are having problems with:

- The name of the program
- The issue of the magazine it was in
- The computer you are using
- Any error messages and the line numbers
- Anything displayed on the screen
- A printout of your listing (if possible)

Send your questions to:

Commodore Microcomputers
1200 Wilson Drive
West Chester, PA 19380
ATTN: Program Problem

C

How to Use the Magazine Entry Program

The Magazine Entry Program on page 125 is a machine language program that will assist you in entering the programs in this magazine correctly. It is for use with the Commodore 64 only and was written by Mark Robin using the IEA Editor/Assembler. Once the program is in place, it works its magic without you having to do anything else. The program will not let you enter a line if there is a typing mistake on it, and better yet, it identifies the kind of error for you.

Getting Started

Type in the Magazine Entry Program carefully and save it as you go along (just in case). Once the whole program is typed in, save it again on tape or disk. Now RUN the program. The word POKING will appear on the top of the screen with a number. The number will increment from 49152 up to 50052, and just lets you know that the program is running. If everything is ok, the program will finish running and end. Then type NEW. If there is a problem with the data statements, the program will tell you where to look to find the problem.

Once the program has run, it is in memory ready to go. To activate the program, type SYS49152 and press RETURN. When the READY prompt is displayed, type TEST and press RETURN. You are now ready to enter the programs from the magazine.

Typing the Programs

All the program listings in this magazine that are for the 64 have an apostrophe followed by four letters at the end of the line (i.e., 'ACDF). The apostrophe and letters *should* be entered along with the rest of the line. This is a checksum that the Magazine Entry Program uses.

Enter the line and the letters at the end and then press RETURN, just as you normally would.

If the line is entered correctly, a bell is sounded and the line is entered into the computer's memory (without the characters at the end).

If a mistake was made while entering the line, a noise is sounded and an error message is displayed. Read the error message, then press any key to erase the message and correct the line.

IMPORTANT

If the Magazine Entry Program sees a mistake on a line, it *does not* enter that line into memory. This makes it impossible to enter a line incorrectly.

Error Messages and What They Mean

There are six error messages that the Magazine Entry Program uses. Here they are, along with what they mean and how to fix them.

NO CHECKSUM: This means that you forgot to enter the apostrophe and the four letters at the end of the line. Move the cursor to the end of the line you just typed and enter the checksum.

QUOTE: This means that you forgot (or added) a quote mark somewhere in the line. Check the line in the magazine and correct the quote.

PARENTHESIS: This means that you forgot (or added) a parenthesis somewhere in the line. Check the line in the magazine again and correct the parenthesis.

KEYWORD: This means that you have either forgotten a command or spelled one of the BASIC keywords (GOTO, PRINT...) incorrectly. Check the line in the magazine again and check your spelling.

OF CHARACTERS: This means that you have either entered extra characters or missed some characters. Check the line in the magazine again. This error message will also occur if you misspell a BASIC command, but create another keyword in doing so. For example, if you misspell PRINT as PRONT, the 64 sees the letter P and R, the BASIC keyword ON and then the letter T. Because it sees the keyword ON, it thinks you've got too many characters, instead of a simple misspelling. Check spelling of BASIC commands if you can't find anything else wrong.

UNIDENTIFIED: This means that you have either made a simple spelling error, you typed the wrong line number, or you typed the checksum incorrectly. Spelling errors could be the wrong number of spaces inside quotes, a variable spelled wrong, or a word misspelled. Check the line in the magazine again and correct the mistake.

C

Magazine Entry Program

The Magazine Entry Program is available on disk, along with the other programs in this magazine, for \$9.95. To order, contact Loadstar at 1-800-831-2694.

```

1 PRINT "[CLEAR]POKING-";
5 P=49152:REM $C000
10 READ AS:IF AS="END"THEN 80
20 L=ASC(MID$(AS,2,1))
30 H=ASC(MID$(AS,1,1))
40 L=L-48:IF L>9 THEN L=L-7
50 H=H-48:IF H>9 THEN H=H-7
60 PRINT"[HOME,RIGHT12]"P;
70 B=H*16+L:POKE P,B:T=T+B:P=P+1
  :GOTO 10
80 IF T<>103233 THEN PRINT"MISTAKE IN
  DATA --> CHECK DATA STATEMENTS":END
90 PRINT"DONE":END
1000 DATA 4C,23,C0,00,00,00,00,00
1001 DATA 00,00,00,00,00,00,00,00
1002 DATA 00,58,C1,5E,C1,66,C1,76
1003 DATA C1,83,C1,8F,C1,EA,EA,EA
1004 DATA 4C,83,C0,A2,05,BD,1D,C0
1005 DATA 95,73,CA,10,F8,60,A0,02
1006 DATA B9,00,02,D9,3C,C1,D0,0B
1007 DATA 88,10,F5,A9,01,8D,10,C0
1008 DATA 4C,1F,C1,60,A0,03,B9,00
1009 DATA 02,D9,38,C1,D0,E0,88,10
1010 DATA F5,A9,00,8D,10,C0,4C,1F
1011 DATA C1,60,A0,03,B9,00,02,D9
1012 DATA 34,C1,D0,E0,88,10,F5,A0
1013 DATA 05,B9,A2,E3,99,73,00,88
1014 DATA 10,F7,A9,00,8D,18,D4,4C
1015 DATA 1F,C1,E6,7A,D0,02,E6,7B
1016 DATA 4C,79,00,A5,9D,F0,F3,A5
1017 DATA 7A,C9,FF,D0,ED,A5,7B,C9
1018 DATA 01,D0,E7,20,5A,C0,AD,00
1019 DATA 02,20,A3,C0,90,DC,A0,00
1020 DATA 4C,EA,C1,C9,30,30,06,C9
1021 DATA 3A,10,02,38,60,18,60,C8
1022 DATA B1,7A,C9,20,D0,03,C8,D0
1023 DATA F7,B1,7A,60,18,C8,B1,7A
1024 DATA F0,35,C9,22,F0,F5,6D,05
1025 DATA C0,8D,05,C0,AD,06,C0,69
1026 DATA 00,8D,06,C0,4C,BD,C0,18
1027 DATA 6D,07,C0,8D,07,C0,90,03
1028 DATA EE,08,C0,EE,0B,C0,60,18
1029 DATA 6D,0A,C0,8D,0A,C0,90,03
1030 DATA EE,09,C0,EE,0C,C0,60,0A
1031 DATA A8,B9,11,C0,85,FB,B9,12
1032 DATA C0,85,FC,A0,00,A9,12,20
1033 DATA D2,FF,B1,FB,F0,06,20,D2
1034 DATA FF,C8,D0,F6,20,54,C3,20
1035 DATA 7E,C3,20,E4,FF,F0,FB,A0
1036 DATA 1B,B9,3F,C1,20,D2,FF,88
1037 DATA 10,F7,68,68,A9,00,8D,00
1038 DATA 02,4C,74,A4,4B,49,4C,4C
1039 DATA 54,45,53,54,41,44,44,91
1040 DATA 91,0D,20,20,20,20,20,20
1041 DATA 20,20,20,20,20,20,20,20
1042 DATA 20,20,20,20,20,20,91,0D
1043 DATA 51,55,4F,54,45,00,4B,45
1044 DATA 59,57,4F,52,44,00,23,20
1045 DATA 4F,46,20,43,48,41,52,41
1046 DATA 43,54,45,52,53,00,55,4E
1047 DATA 49,44,45,4E,54,49,46,49
1048 DATA 45,44,00,4E,4F,20,43,48
1049 DATA 45,43,4B,53,55,4D,00,50
1050 DATA 41,52,45,4E,54,48,45,53
1051 DATA 49,53,00,C8,B1,7A,D0,FB
1052 DATA 84,FD,C0,09,10,03,4C,C7
1053 DATA C1,88,88,88,88,88,B1,7A
1054 DATA C9,27,D0,13,A9,00,91,7A
1055 DATA C8,A2,00,B1,7A,9D,3C,03
1056 DATA C8,E8,E0,04,D0,F5,60,4C
1057 DATA F2,C2,A0,00,B9,00,02,99
1058 DATA 40,03,F0,F2,C8,D0,F5,A0
1059 DATA 00,B9,40,03,F0,E8,99,00
1060 DATA 02,C8,D0,F5,20,D7,C1,4C
1061 DATA 56,C2,A0,0B,A9,00,99,03
1062 DATA C0,8D,3C,03,88,10,F7,A9
1063 DATA 80,85,02,20,1B,C3,A0,00
1064 DATA 20,9B,C1,20,CA,C1,20,31
1065 DATA C2,E6,7A,E6,7B,20,7C,A5
1066 DATA A0,00,20,AF,C0,F0,CD,24
1067 DATA 02,F0,06,20,D7,C0,4C,12
1068 DATA C2,C9,22,D0,06,20,BC,C0
1069 DATA 4C,12,C2,20,E7,C0,4C,12
1070 DATA C2,A0,00,B9,00,02,20,A3
1071 DATA C0,C8,90,0A,18,6D,09,C0
1072 DATA 8D,09,C0,4C,33,C2,88,A2
1073 DATA 00,B9,00,02,9D,00,02,F0
1074 DATA 04,E8,C8,D0,F4,60,18,AD
1075 DATA 0B,C0,69,41,8D,0B,C0,38
1076 DATA AD,0C,C0,E9,19,90,06,8D
1077 DATA 0C,C0,4C,60,C2,AD,0C,C0
1078 DATA 69,41,8D,0C,C0,AD,05,C0
1079 DATA 6D,07,C0,48,AD,06,C0,6D
1080 DATA 08,C0,8D,0E,C0,68,6D,0A
1081 DATA C0,8D,0D,C0,AD,0E,C0,6D
1082 DATA 09,C0,8D,0E,C0,38,E9,19
1083 DATA 90,06,8D,0E,C0,4C,96,C2
1084 DATA AD,0E,C0,69,41,8D,0E,C0
1085 DATA AD,0D,C0,E9,19,90,06,8D
1086 DATA 0D,C0,4C,AB,C2,AD,0D,C0
1087 DATA 69,41,8D,0D,C0,A0,01,AD
1088 DATA 0B,C0,CD,3C,03,D0,20,C8
1089 DATA AD,0C,C0,CD,3D,03,D0,17
1090 DATA C8,AD,0D,C0,CD,3E,03,D0
1091 DATA 0E,AD,0E,C0,CD,3F,03,D0
1092 DATA 06,20,64,C3,4C,7A,C0,AD
1093 DATA 10,C0,D0,11,98,48,68,4C
1094 DATA F7,C0,AD,10,C0,F0,01,60
1095 DATA A9,04,4C,F7,C0,A4,FD,A9
1096 DATA 27,91,7A,A2,00,C8,BD,0B
1097 DATA C0,91,7A,C8,E8,E0,04,D0
1098 DATA F5,A9,00,91,7A,20,64,C3
1099 DATA 4C,7A,C0,A0,00,B9,00,02
1100 DATA F0,11,C9,28,D0,03,EE,03
1101 DATA C0,C9,29,D0,03,EE,04,C0
1102 DATA C8,D0,EA,AD,03,C0,CD,04
1103 DATA C0,D0,01,60,A9,05,4C,F7
1104 DATA C0,A9,20,8D,00,D4,8D,01
1105 DATA D4,A9,09,8D,05,D4,A9,0F
1106 DATA 8D,18,D4,60,20,41,C3,A9
1107 DATA 81,20,77,C3,A9,80,20,77
1108 DATA C3,4C,71,C3,20,41,C3,A9
1109 DATA 11,20,77,C3,A9,10,20,77
1110 DATA C3,A9,00,8D,04,D4,60,8D
1111 DATA 04,D4,A2,70,A0,00,88,D0
1112 DATA FD,CA,D0,FA,60,END

```


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DUAL SCREEN

Continued from pg. 64

say, look at your variables by hitting the NO SCROLL key. Hitting the NO SCROLL key again continues it. If you wish to question another variable in your program, hit the STOP key, which gives you a flashing cursor on the 80-column screen. Type PRINT A (or whatever variable you wish to know the value of) and hit RETURN. If you wish to change the value of a variable, you type A = 5 (or whatever) and hit RETURN. You continue the program by entering CONT. All this, and you never once bothered the 40-column screen.

For quick variable printouts of your program on the 80-column screen, just add this typical one liner in the proper place:

```
75 GRAPHIC 5,0:PRINT"VARIABLE Q IS":Q:GRAPHIC 0,0
```

The dual-screen capability of the Commodore 128 is an invaluable asset to programmers. Whether you take advantage of it by switching back and forth between screens on the 1902 or by hooking up two monitors—one for 40 and one for 80 columns—you'll find many uses for it in your programming.

Example Program

Here is a short routine for finding prime numbers within a range of numbers.

```
10 INPUT "LOW NUMBER (MUST BE ODD)":L
20 IF INT(L/2)=L/2 THEN 10
30 INPUT "HI NUMBER":H
40 IF L>H THEN 30
50 PRINT "PROGRAM IS RUNNING"
60 FOR N=L TO H STEP 2
70 FOR J=3 TO SQR(N) STEP 2
80 A=N/J
90 IF INT(A)=A THEN C=1:J=N
100 NEXT
110 IF C=0 THEN PRINT N,
120 C=0
130 NEXT
```

To have it run on the 40-column screen while showing you what it's doing on the 80-column, add these lines:

```
85 GRAPHIC 5,0
87 PRINT "CHECKING N":N "DIVIDING BY J":J "IS":A
105 IF C=0 THEN PRINT "GOOD NUMBER":N
107 GRAPHIC 0,0
135 GRAPHIC 0,0
```

TEAM MATE

Continued from pg. 41

your last operation simply by pressing the "Q" key while pressing the Commodore key. Standard options such as copy, insert, manual or automatic calculation, freezing certain cells, formula copying, floating-point or dollar format, IF-TRUE tests, sum of a range of cells, and finding minimums/maximums. This is a full-featured spreadsheet that only lacks work space.

Graphics

The graphics package is a flexible program that will not only draw a graph of your data, but also edit that graph. It will accept data from the user directly or extract data from a spreadsheet file and create line, bar or pie graphs. It will even read data from files that were created by some other spreadsheet programs, provided those programs can create ASCII files. The line graph allows up to 3 sets of variables containing up to 50 elements each. The bar graph allows up to 3 sets of variables containing up to 12 elements each, and the pie chart allows 1 variable with 9 data elements.

Additional commands are available for filling an area, drawing lines and circles, automatic or manual scaling of the graph, and the use of floating-point or integer values. The graphics package also has provisions for high-resolution and text editing of the graph as well as data and picture storage onto disk or printer. This graphics package truly enhances the versatility of *Team Mate*.

The manual is professional and easy to follow. You are walked through detailed examples and each program is explained right up through the integration process.

If you're looking for a productivity package for home use on your Commodore 64, then *Team Mate* gives you all the power you'll need, provided you can live within the memory constraints of the system. Disk swapping is limited to data disks, since all of the programs that you need are in memory. There are even a few utility programs on the disk for formatting and data disk copying.

(Editor's Note: Recent updates of the program include a Commodore 128 module for each section, to take advantage of the 128's expanded capabilities.)

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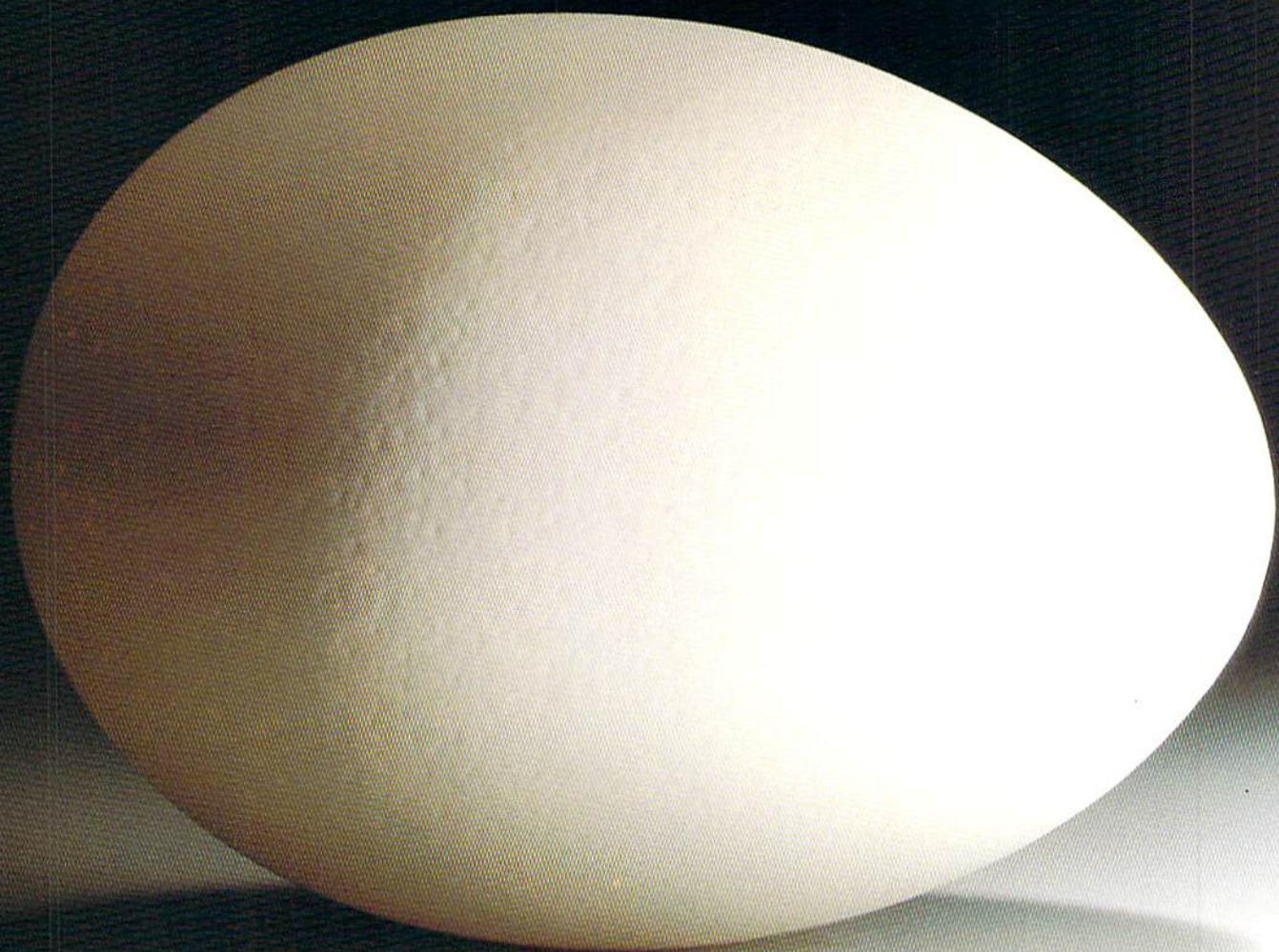
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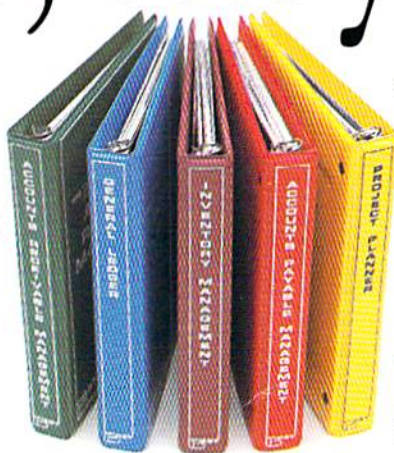
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A Printer For All Reasons

Search For The Best High Quality Graphic Printer

If you have been looking very long, you have probably discovered that there are just too many claims and counter claims in the printer market today. There are printers that have some of the features you want but do not have others. Some features you probably don't care about, others are vitally important to you. We understand. In fact, not long ago, we were in the same position. Deluged by claims and counter claims. Overburdened by rows and rows of specifications, we decided to separate all the facts — prove or disprove all the claims to our own satisfaction. So we bought printers. We bought samples of all the major brands and tested them.

Our Objective Was Simple

We wanted to find that printer which had all the features you could want and yet be sold directly to you at the lowest price. We didn't want a "close-out special" of an obsolete product that some manufacturer was dumping, so we limited our search to only those new printers that had the latest proven technology. We wanted to give our customers the best printer on the market today at a bargain price.

The Results Are In

The search is over. We have reduced the field to a single printer that meets all our goals (and more). The printer is the SP-1000 from Seiko-sha, a division of Seiko (one of the foremost manufacturers in the world). We ran this printer through our battery of tests and it came out shining. This printer *can* do it all. Standard draft printing at a respectable 100 characters per second, and with a very readable 12 (horizontal) by 9 (vertical) character matrix. This is a full bi-directional, logic seeking, true descender printer.

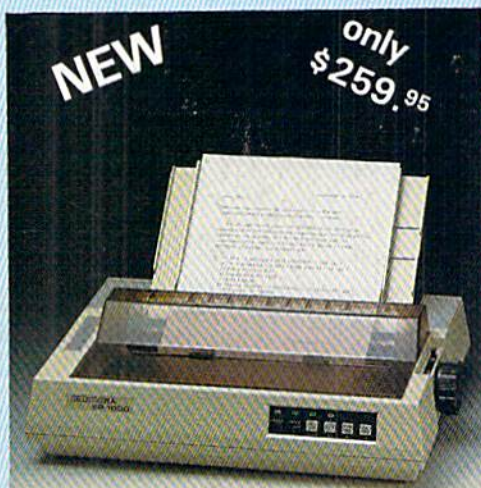
"NLQ" Mode

One of our highest concerns was about print quality and readability. The SP-1000 has a print mode termed Near Letter Quality printing (NLQ mode). This is where the SP-1000 outshines all the competition. Hands down! The character matrix in NLQ mode is a very dense 24 (horizontal) by 18 (vertical). This equates to 41,472 addressable dots per square inch. Now we're talking *quality* printing. It looks like it was done on a typewriter. You can even print graphics using the standard graphics symbols built into your computer. The results are the best we've ever seen. The only other printers currently available having resolution this high go for \$500 and more *without* the interface or cable needed to hook up to your computer.

Features That Won't Quit

With the SP-1000 your computer can now print 40, 48, 68, 80, 96, or 136 characters per line. You can print in ANY of 35 character styles including 13 double width and 3 reversed (white on black) styles. You not only have the standard Pica, Elite, Condensed and Italics, but also true Superscripts and Subscripts. Never again will you have to worry about how to print H₂O or X². This fantastic

machine will do it automatically, through easy commands right from your keyboard. Do you sometimes want to emphasize a word? It's easy, just use **bold** (double strike) or use *italics* to make the words stand out. Or, if you wish to be even more emphatic, underline the words. You can combine many of these modes and styles to make the variation almost endless. Do you want to express something that you can't do with words? Use graphics with your text — even on the same line. You have variable line spacing of 1 line per inch to infinity (no space at all) and 143 other software selectable settings in between. You can control line spacing on a dot-by-dot basis. If you've ever had a letter or other document that was just a few lines too long to fit a page, you can see how handy this feature is. Simply reduce the line spacing slightly and ... VOILA! The letter now fits on one page.



Forms? Yes! Your Letterhead? Of Course!

Do you print forms? No problem. This unit will do them all. Any form up to 10 inches wide. The tractors are adjustable from 4 to 10 inches. Yes, you can also use single sheets. Plain typing paper, your letterhead, short memo forms, labels, anything you choose. Any size to 10" in width. In fact this unit is so advanced, it will load your paper automatically. Multiple copies? Absolutely! Use forms (up to 3 thick). Do you want to use spread sheets with many columns? Of course! Just go to condensed mode printing and print a full 136 columns wide. Forget expensive wide-carriage printers and changing to wide carriage paper. You can now do it all on a standard 8 1/2" wide page, and you can do it quietly. The SP-1000 is rated at only 55 dB. This is quieter than any other impact dot matrix printer that we know of and is quieter than the average office background noise level.

Consistent Print Quality

Most printers have a ribbon cartridge or a single spool ribbon which gives nice dark

printing when new, but quickly starts to fade. To keep the printers output looking consistently dark, the ribbons must be changed quite often. The SP-1000 solves this problem by using a wide (1 1/2") ribbon cartridge that will print thousands of pages before needing replacement. (When you finally do wear out your ribbon, replacement cost is only \$11.00. Order #2001.)

The Best Part

When shopping for a printer with this quality and these features, you could expect to pay around \$500 or more. *Not now!* We sell this fantastic printer for only \$259.95! You need **absolutely nothing else to start printing — just add paper.**

No Risk Offer

We give you a 2-week satisfaction guarantee. If you are not completely satisfied for any reason we will promptly refund your purchase. A 1-year warranty is included with your printer. The warranty repair policy is to repair or replace and reship to the buyer within 72 hours of receipt.

The Bottom Line

Be sure to specify the order # for the correct version printer designed for your computer.

Commodore C-64 & C-128, Order #2200, cable included

IBM-PC and compatibles, Order #2100, plus 8' cable #1103, \$26.00

Standard Parallel with 36 pin Centronics connector, Order #2400, no cable

We also have interfaces and cables for other computers not listed. Call Customer Service at 805/987-2454 for details.

Shipping and insurance is \$10.00 — UPS within the continental USA. If you are in a hurry, UPS Blue (second day air), APO or FPO is \$22.00. Canada, Alaska, Mexico are \$30.00 (air). Other foreign is \$70.00 (air). California residents add 6% tax. The above are cash prices — VISA and MC add 3% to total. We ship the next business day on money orders, cashiers' checks, and charge cards. A 14-day clearing period is required for checks.

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